DOCUMENT RESUME

ED 231 781 SP 022 484

AUTHOR	Zaichkowsky, Leonard D., Ed.; Sime, Wesley E., Ed.
TITLE	Stress Management for Sport.
INSTITUTION	American Alliance for Health, Physical Education, Recreation and Dance, Reston, VA. National Association for Sport and Physical Education.
PUB DATE	82
NOTE	129p.
AVAILABLE FROM	American Alliance for Health, Physical Education, Recreation and Dance, P. O. Box 704, Waldorf, MD 20601 (Stock Number 245-26986, $8.95).
PUB TYPE	Reports - Descriptive (141) -- Viewpoints (120)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Athletes; *Athletic Coaches; Biofeedback; Cerebral Dominance; *Competition; *Conditioning; Coping; Gymnastics; Higher Education; Hypnosis; *Relaxation Training; Running; Secondary Education; *Stress Variables; Swimming; Teaching Methods
IDENTIFIERS	*Stress Management

ABSTRACT

Included in this volume are papers on stress management in athletics; eight of the ten papers are followed with a "Coach's Reaction": (1) "Competitive Athletic Stress Factors in Athletes and Coaches" (Walter Kroll); (2) "Mental Preparation for Peak Performance in Swimmers" (Eugene F. Gauron)--Coach's Reaction by Suzi D'Annolfo; (3) "Cognitive Somatic Behavioral Interventions in Gymnastics" (Kenneth Ravizza and Robert Rotella)--Coach's Reaction by Hayes Kruger; (4) "Application of Stress Management in Competitive Runners" (Susan G. Zeigler)--Coach's Reaction by Edwin J. Stoch; (5) "Biofeedback for Self-regulation of Competitive Stress" (Leonard D. Zaichkowsky)--Coach's Reaction by David Hemery; (6) "The Role of Hypnosis in Competitive Stress Management" (Veronica L. Eskridge)--Coach's Reaction by Betty R. Hammond; (7) "Stress Management for Professional and World-Class Competition" (Michael D. Margolies)--Coach's Reaction by Robert E. Neeves; (8) "Coaching Strategies Based upon Tension Research" (A. B. Frederick)--Coach's Reaction by Andrea B. Schmid; (9) "Hemispheric Dominance: Using the Right Brain in Sports" (Evelyn G. Hall)--Coach's Reaction by Joan A. Finn; and (10) "Competitive Stress Management Techniques in Perspective" (Wesley E. Sime). (CJ)

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STRESS MANAGEMENT FOR SPORT

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for Health, Physical Education
Recreation and Dance
1900 Association Drive
Reston, Virginia 22091
Stock Number: 245-26986

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Article III

Bylaws, Article III

Table of Contents

Foreword vii

1 Competitive Athletic Stress Factors in Athletes and Coaches
Dr. Walter Kroll 1

2 Mental Preparation for Peak Performance in Swimmers
Dr. Eugene F. Gauron 11

Coach's Reaction
Dr. Suzi D'Annolfo 22

3 Cognitive Somatic Behavioral Interventions in Gymnastics
Dr. Kenneth Ravizza and Dr. Robert Rotella 25

Coach's Reaction
Hayes Kruger 36

4 Application of Stress Management in Competitive Runners
Dr. Susan G. Ziegler 39

Coach's Reaction
Edwin J. Stoch 52

5 Biofeedback for Self-regulation of Competitive Stress
Dr. Leonard D. Zaichkowsky 55

Coach's Reaction
David Hemery 65

6 The Role of Hypnosis in Competitve Stress Management
Dr. Veronica L. Eskridge 67

Coach's Reaction
Dr. Betty R. Hammond 71

7 Stress Management for Professional and World-Class Competition
Michael D. Margolies 73

Coach's Reaction
Dr. Robert E. Neeves 77

8 Coaching Strategies Based upon Tension Research
Dr. A. B. Frederick 81

Coach's Reaction
Dr. Andrea B. Schmid 95

9 Hemispheric Dominance: Using the Right Brain in Sports
Dr. Evelyn G. Hall 101

Coach's Reaction
Joan A. Finn 113

10 Competitive Stress Management Techniques in Perspective
Dr. Wesley E. Sime 117

About the Authors 124

Foreword

Human stress has long been a topic of research and teaching for professional physical and health educators as well as other professionals in the behavioral and health sciences. The enormous contributions of Hans Selye certainly sparked much of the scholarly work in the 1950s, 60s, and 70s—work which focused on the problems associated with defining stress and its related constructs, the effects of stress on performance, methodological problems associated with research on stress, etc. In recent years, however, professionals in clinical and educational psychology, and the allied health professions have refocused their efforts more in the direction of developing stress management techniques so that individuals under stress may better cope with everyday life.

This "clinical thrust" has likewise spread to the rather new specialized area of sport psychology. Sport psychologists, teachers, coaches, and athletes have become increasingly interested in enhancing performance by addressing the problems presented by competitive stress in athletics. To confront the negative effects of competitive stress and to capitalize upon the positive effects, sport psychologists began to borrow techniques developed by clinical psychologists for "clinical" populations, and adapted them to athletes who had no psychopathologic symptoms.

Because of this recent research and clinical interest in stress management within sport, the Sport Psychology Academy under the chairmanship of William F. Straub, Ithaca College, sponsored a pre-convention symposium entitled "The Coach/Sport Psychologist Interface: New Directions in Stress Management." This book is a collection of papers which were presented by respected sport psychology researchers, practitioners, and coaches at the pre-convention symposium held April 12th and 13th, 1981 in Boston, Massachusetts.

The papers have been organized in a logical sequence to deal with the issues at hand. Regarding format, a major review paper on a selected topic is presented first, followed by a brief reaction from a coach. All of the papers except the introduction by Walter Kroll and the final synopsis by Wes Sime are followed by a coach's reaction.

The first paper in this book was authored by Dr. Walter Kroll and presented as the Knute Rockne Memorial Address to the Sport Psychology Academy on April 12th, 1981. Dr. Kroll, who has written extensively in the sport psychology/motor behavior field, presents a scholarly overview of competitive stress which features a well-researched description of: causative factors that elicit stress responses in athletes and coaches; techniques of stress reduction.

The next three papers and reactions are concerned with applying stress management techniques to specific sports. Dr. Gauron presented a thorough description of his mental preparation program for the University of Iowa's swim team. In addition to detailing objectives and methodology, Dr. Gauron presented a summary of evaluation data. Dr. Ken Ravizza and Dr. Robert Rotella described a psychological training program for youth and college age gymnasts of varying ability levels. The authors detailed their five-point program which entails athlete interviews, the rationale behind self-control, the determination of anxiety level, cognitive-somatic behavioral intervention, and transfer of coping strategies. Dr. Susan Ziegler focused on cross-country runners as her athlete population in describing stress management techniques. Professor Ziegler described stress management models developed by Meichenbaum (stress-innoculation training) and by Smith (cognitive-affective stress management training) and related techniques. She also presented data from her own stress management program on cardiovascular performance of cross-country runners.

The next two papers present a state-of-the-art review of two "new" and perhaps provocative techniques of stress management in sport. Dr. Leonard Zaichkowsky, who has been an active researcher in the biofeedback field for several years, presents an overview of biofeedback, its history, principles, and specific application to managing competitive stress. The equally specialized technique of hypnosis is discussed by Dr. Veronica Eskridge. Dr. Betty Hammond reacted to this paper by asking interesting questions related to methodology as well as legal and ethical ramifications. It was followed by Michael Margolies' description of relaxation and imagery techniques he used with elite world-class athletes to help them cope with competitive stress and to improve performance.

Dr. Bruce Frederick, a long time teacher and practitioner of Jacobsonian relaxation and highly respected gymnastics coach, reviewed the research on stress and tension control then abstracted twenty-six practical suggestions based upon this research. Dr. Andrea Smith, former international competitor and gymnastics coach reacted with a number of personal experiences that lend empirical credibility.

Dr. Evelyn Hall described what is known and not known about how relaxation and visual imagery relate to right brain function in sport. Aspects of peak performance can likely be attributed to shifts in hemispheric activity during performance.

In the final paper, "Competitive Stress Management Techniques in Perspective," Dr. Wesley Sime reviewed and synthesized all the papers and coaches' reactions published in this book. He also presented a model to be used by coaches in choosing an appropriate method for selected athletes based upon specific characteristics inherent in the coach, the athlete, and the sport.

To our knowledge, this book is the first published collection of papers which focuses upon competitive stress management techniques. We are hopeful that the papers and reactions will serve to spark further interest in the investigation of competitive stress—particularly rigorous evaluations of stress management programs. This book would not have been possible without the foresight and dedication of Dr. William Straub who served as Chairman of the Sport Psychology Academy in 1981. We wish to thank Bill for his outstanding work in organizing this conference and for facilitating the publication of this book.

Dr. Leonard D. Zaichkowsky
and
Dr. Wesley E. Sime

1

Competitive Athletic Stress Factors in Athletes and Coaches*

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The stress associated with athletic competition is hardly invisible. Even the most casual observer can sense the high pitched nervous tension exhibited by both coach and athlete, before, during, and after competition. For the athlete and coach the experience of competitive stress becomes a routine event, an undesirable experience that must be suffered for the glory of competition. Too often the competitive stress becomes more, rather than less, troublesome. So troublesome, in fact, that the stress affects performance, contributes to emotional unhappiness, and is even responsible for the athlete quitting competition entirely. Nearly all of the Japanese athletes returning from the 1960 Rome Olympics, for example, reported that stress detrimentally affected their performance.[1] The cumulative stress effects are apparent in the finding that about 50 percent of nationally ranked swimmers in 1968 had quit swimming by 1972. The overwhelming reason given by the swimmers who quit was the pressure created by an inability to perform up to expectations.[2]

Athletes are consistently reported as having lower anxiety levels than non-athletes, and older, more experienced athletes have lower anxiety levels than younger, less experienced athletes. Such results have been interpreted to mean that athletes learn to control and reduce anxiety.[3] But the results could also be interpreted as meaning that athletes with higher anxiety levels are driven out of athletics, either by their inability to tolerate high anxiety situations or because of elimination from competition due to inferior performance. Whatever the correct interpretation, it is clear that low anxiety is an important contributor to successful athletic performance while high anxiety levels are detrimental both to performance and emotional well-being.

Before addressing the issue of psychological anxiety, however, it may be a good idea to make a comment or two about stress. When working with the performance capabilities of human beings one should not consider only psychological stress factors since physiological stress factors are also essential considerations. Quite often, consideration of psychological anxiety is done with such a narrow focus that recognition of physiological stress factors is overlooked. Indeed, one of the major contributions to be made in the study of stress in athletics is to consider the "total" picture of stress: physiological and psychological stress factors as an entity, since either source, individually or in combination, act upon actual performance.

As seen in Table 1, both psychological and physiological sources can contribute to the total amount of stress present. Furthermore, the same effects upon performance can occur from either psychological or physiological sources. In essence, equivalent effects upon

*Knute Rockne Memorial Address, Sport Psychology Academy of the National Association of Sport and Physical Education, AAHPERD Convention, Boston, Massachusetts, April 12, 1981.

performance can be produced by physiological or psychological sources. High psychological anxiety could affect performance detrimentally but so could physical fatigue or infection. Thus, although this presentation addresses athletic stress in the psychological context, it should be recognized that effects upon performance could just as equally be caused by physiological factors.

Table 1. Physiological and psychological contributors to stress.

Stress	
Psychological	**Physiological**
anxiety	diet
guilt	fatigue
anger	infection
despondency	inadequate rest

Anxiety Inventories

At the present time considerable disagreement exists over the definition of anxiety and several different theoretical approaches to the study of anxiety are competing for more widespread recognition and acceptance. Comparison of competing theories of anxiety is made difficult since proponents of different theories tend to restrict experimental and theoretical work to their own theory and mostly ignore competing theories.[4] Without becoming entangled in a debate about which is the best theory, one can reasonably adopt an operational system forwarded by Spielberger with which to consider the phenomenon of anxiety in the athletic context. As depicted in Diagram 1, the impending athletic competition represents the stress stimulus; individual athletes may perceive the stress stimulus elements in athletic competition differently depending upon such factors as prior experiences, age, sex, intelligence, motivation, and in addition, the effect of both the stress stimulus properties and the individual perception of the stress stimulus elements presumed to be the cause of an emotional response which is typically designated as an anxiety state.

It is important to note that most anxiety scales seek to monitor the intensity of anxiety signs and symptoms present in the emotional

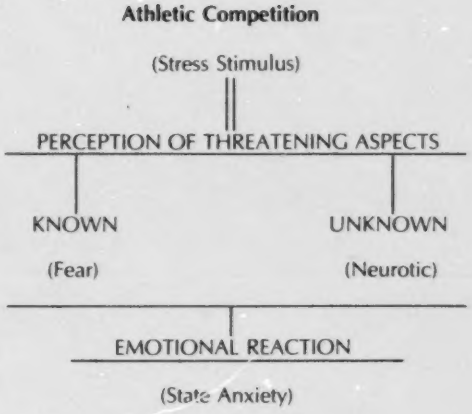

Diagram 1. Competitive stress paradigm.

response stage. The causes of such an emotional response, which must surely lie within the stress stimulus itself or the perception of the stress stimulus elements by an individual, remains fairly well unstudied by contemporary sport psychologists. At best, the kind of stress presented in laboratory studies may be manipulated and the investigators predict what the variation in the stress stimulus means.

Whether the signs and symptoms be somatic complaints or behavioral aberrations, anxiety scales are primarily designed for the assessment of the consequences of the emotional response to stress stimuli. This observation applies equally well to both trait and state anxiety scales. Since most anxiety scales contain items pertaining to the end result of the stress stimulus and its perception by subjects, the nature of the stress stimulus and the nature of the perception of the stress stimulus by subjects, escapes definition. In effect, little attempt has been made to identify the causative factors responsible for pre-competitive anxiety. As a result we are faced with the classification of athletic competition as an unknown fear composite.

There is value in considering the specific factors which contribute to the athlete's precompetitive anxiety level. Rather than assessment of the intensity level of the anxiety, assessment of the causes is important because it can help guide attempts to reduce the unwanted anxiety. A novel research strategy was

adopted to seek such information: athletes were asked what they were thinking about, concerned about, apprehensive about, worried about, or fearful about; athletes were interviewed in locker rooms, on the sidelines, in their homes, or anywhere they could be located on the day of competition; an inventory of 125 items resulted containing stress items most frequently cited by athletes.

Causative Factors of Competitive Stress

Why are athletes troubled by precompetitive anxiety? Examination of individual items suggested that certain items appeared to be related in terms of a common causative factor. Subsequent analysis of item inter-correlation matrices, correlation of an item with its proposed sub-scale, and factor analysis results suggested some categories of causative factors. Even without the benefit of statistical analysis, some of the resulting item clusters hint at theoretically acceptable constructs capable of qualifying as anxiety-producing factors in athletic competition. The items, however, come from athletes and not from theory or computer printouts.

Somatic Complaints

It is not surprising that athletes report being concerned about physical manifestations of anxiety since somatic sensations are an inherent feature of the emotional response to stress stimuli. Most of the items appearing on a list of somatic complaints are familiar ones and appear in one form or another on many anxiety scales with the possible exception of the item "yawning too much." One physiological explanation for yawning suggests that it is a mechanism for increasing the supply of oxygen to the vital organs, particularly the brain. Since worry and apprehension are presumably capable of creating an oxygen deficiency, the appearance of yawning on an anxiety scale is not too surprising even if it was unexpected.

The Somatic Complaint scale (see Table 2) is high for all athlete groups but a particular concern for younger athletes who associate their somatic problems with weaknesses and deficiencies to the point of hiding their somatic symptoms. A coach can tremendously help younger athletes just by talking about the pre-game jitters and the kind of somatic symptoms they can produce. Identification and acknowledgement of the stress or unknown fear can reduce anxiety.

Fear of Failure

Atkinson theorized that the motivation set known as fear of failure constituted the "source of the conscious experience of anxiety," and the amount of anxiety induced in any situation would be proportionate to the intensity of the fear of failure present.[5] Such a fear of failure construct seems represented by the items of letting teammates down, performing up to the level of ability, losing, and living up to the coach's expectations (see Table 3). One can also identify items with suggestive similarity to the construct of possible em-

Table 2. Somatic complaints.

- tightness in neck
- upset stomach
- nervousness
- awareness of heartbeat
- urge to urinate
- ringing in the ears
- yawning too much
- trembling
- throwing up
- general body sweating
- sore muscles

Table 3. Fear of failure.

- making a foolish mistake
- letting teammates down
- performing up to the level of ability
- losing
- quitting the team
- pressure to win
- poor work-outs
- mind going blank
- making a critical mistake
- choking up
- falling for a sucker play
- criticism by coach
- improving upon the last performance
- value of athletics
- psychological preparedness
- living up to the coach's expectations
- presence of friends/relatives among spectators

barassment which Sarason has shown to be linked to anxiety.[6] Items such as making a foolish mistake, falling for a sucker play, and choking appear to align themselves with a possible embarassment construct.

Feelings of Inadequacy

The feelings of inadequacy list (see Table 4) contains items similar to those found on the fear of failure list which also suggest the Sarason construct of possible embarassment. However, the items on the feelings of inadequacy list seem to describe a construct slightly different from one of possible embarassment. The items on the feelings of inadequacy list characterize an attitude of "something is wrong with me," or as has sometimes been suggested, an attitude of self-depreciation and personal malcontent.[7]

Loss of Control

The items on the loss of control list (see Table 5) suggest a striking similarity to Rotter's concept of external locus of control in which forces beyond one's own control are operative and the individual has no control over events taking place.[8] The individual characterized by an external locus of control is more likely to feel that desirable outcomes are primarily determined by good luck rather than by hard work.

Guilt

The items appearing on the guilt list (see Table 6) suggest problems of morality and aggression. As is known, of course, guilt can contribute to heightened anxiety and it would appear that guilt is one of the causes of anxiety in the pre-competitive situation. (The item, "my sex life," by the way, is actually a purified version of some of the terms suggested by the athletes studied.)

The Guilt scale has proven to be inextricably involved with aggression and sportsmanship. Consider some basic information about aggression; an attempt will be made to illustrate how aggression can produce guilt, raise anxiety, and detrimentally affect performance.

Table 4. Feelings of inadequacy.

- getting tired
- lack of desire
- feeling weak
- physical appearance
- poor fit of equipment
- coach ignoring subject
- not enough rest
- inability to psych-up
- running out of gas
- being afraid
- remembering instructions
- fear
- going stale
- general restlessness
- biting fingernails
- unable to concentrate
- feeling silly
- physical condition

Table 5. Loss of control.

- jinx
- behavior of spectators
- equipment failure
- conduct of opponents
- unfair officials
- boisterous spectators
- poor officials
- bad luck
- temperature
- weather
- people asking questions
- being outcoached
- poor spectator turn-out
- condition of playing surface
- noisy locker room
- being injured

Table 6. Guilt.

- hurting an opponent
- making an opponent look foolish
- playing dirty
- not being mean enough
- swearing too much
- sportsmanship
- losing temper
- sex life
- spectator's booing

Aggression

There are at least two basic kinds of aggression, reactive and instrumental, which are typically differentiated by the presence or absence of emotion/hate. Regardless of the kind of aggression expressed, guilt is an inescapable product. Guilt, in turn, produces

heightened anxiety, projection, and displacement (see Table 7).

Aggression is commonly described as the *intent* or the initiation of an attack on another with the goal of doing harm, either physical or psychological. All athletic competition, then, by definition is aggression. If I win, you lose and I have done you harm. Winning always involves doing injury to others, either physical or psychological.

- Why do spectators "get mad" at their team? coach? players?
- Why do coaches get angry with officials?

Courtesy of Rocky Carzo

- Assume your parent is a champion tennis player who has taught and coached you since early childhood. At the age of 18 you enter a national amateur tournament and see that your opponent in the championship finals is your parent.
  —What "feelings" do you have?
  —What difference does a son or a daughter make in this example?—What difference would beating your father make as far as your feelings? Would a daughter and a son have the same feelings against the father or the mother as an opponent?

Although losing has been talked about more than winning when it comes to undesirable psychological consequences, winning too much can also have some undesirable consequences. The more reactive aggression that is present in the consistent winner the more undesirable the consequences. There was an in-depth interview with an outstanding professional tennis player: the player was always trained to hate the opponent. At the age of 22 years, having won more than 500 tennis matches and having earned more than 1.3 million dollars the player was unhappy and stopped playing tennis. "Maybe I was winning too much." The player was Chris Evert.

The point is reasonably clear. If an athlete views the opponent as an enemy to be hated and despised, the guilt of winning is even greater than when the aggression is instrumental. Conflict with the ethical code of an athlete, sportmanship, also enters the picture. If an athlete is coached to be aggressive in a reactive set and the athlete also doesn't believe in hurting an opponent because of ethical codes, the guilt is even more heightened.

Table 7. Categories of aggression.

Aggression

Reactive	**Instrumental**
anger	calm
hate	goal-oriented
Guilt	
anxiety	
projection	
displacement	

Stress Factors in Coaching

There are stress factors in coaching which are just as obvious as the stress factors observed in athletes. It is known that the heart rate of coaches is considerably elevated during contests. Gazes and his associates, for example, reported that the mean heart rate of football and basketball coaches to be 132

during contests compared to a resting heart rate of 68/70 per minute.[9] Some heart rates were up to 150 during the pre-game period, and one coach had a mean heart rate of 166 throughout a contest reaching a peak of 188 per minute. The use of tranquilizers, towel chewing, and boisterous antics of coaches are common observations.[10]

We recently have undertaken an investigation of stress factors in coaches modelled after the research strategy utilized to identify causative factors of stress in athletes. Ninety-three

Photograph by Dick Raphael

male high school coaches have been interviewed and asked to relate what circumstances caused them concern, worry, apprehension, and emotional turmoil in relation to their coaching responsibilities. By intent, stress factors related to the time of actual competition were *not* assessed. In addition, some coaches (N = 42) were subsequently questioned about educational values and practices in athletics.

Almost 800 usable items resulted which were sorted on a logical and arbitrary basis into homogeneous categories. These homogeneous categories could represent major causative factors of stress in coaches. As seen in Table 8, the two most frequently cited categories involved interpersonal relations with the athlete, outdistancing categories reflecting technical expertise (incorrect strategy, being outcoached). Being unappreciated by athletes, administration, and the public also reflects the interpersonal category. These stress factor categories compare very well with reasons cited for quitting the coaching profession where poor player/coach relationships and inability to motivate players are cited about four times more often than lack of technical expertise.[11]

But more important than these categories was the insight gained as a result of the second part of the study in which follow-up interviews were conducted with more specific questioning about educational values and practices. Every one of the 93 coaches agreed that the emphasis, or the pressure, or the present-day value system forced them to make decisions and to do things that caused them uneasiness and concern. Two of the possible causes for the stress categories will be presented: a professionalized attitude toward play; a conscience orientation conflict.

Table 8. Competitive stress factors in coaching.

Stress Factors in Coaching	
Category	**Frequency**
disrespect from players	42.8%
not being able to reach players	20.7%
incorrect strategy	9.0%
being outcoached	4.0%
unappreciated by: players,	3.0%
administration,	14.0%
public	6.5%
apprehension before contests	100%

Professional Versus Play Orientations

In 1969 Webb argued that attitudes toward play are not stable, but typically demonstrate a progressive change from an initial play orientation to a professional orientation as reflected by the relative value placed upon a triad of concepts: success (victory); skill (performance); fairness (equity).[12] A play orientation values fairness and skill over success while a professionalized attitude toward play values success over skill and fairness. A number of studies have shown that participation in organized athletics is associated with a higher incidence of professional orientation.[13,14,15]

Many of the conflicts coaches reported could be linked to the professional versus play orientation concept. Coaches are characterized by a professional orientation valuing success and skill over fairness. In agreement with Albinson who found only one coach out of 117 volunteer ice hockey coaches to value fairness over success and skill,[16] not a single coach out of our 93 valued fairness first. Athletes do not seem to have as strong a professional orientation. Loy has shown for college-age subjects that only 41% of male varsity athletes and 19.1% of female varsity athletes could be classified as having a professional orientation (Webb scale scores of 4, 5, and 6).[17]

There are numerous examples of the conflicts professionally-oriented coaches experience with less dominant professionally-oriented athletes, administrators, and parents. Some of the conflicts reported by coaches reflect their orientation and include situations such as: required practice on weekends; required practice on school holidays and vacation periods; athletes not missing practice or contests because of outside commitments (music lessons, family vacations, club outings, hobbies, employment).

Coaches view disagreements with their strong professionalized orientation as indicating lack of commitment from athletes. School administrators and parents who resist the coach's legitimate expectations of dedication from athletes are typically dismissed as naive, against excellence, or as troublemakers. Such conflicts seem inevitable between the coach and the athlete, school administrator, and parent because of the two different value systems in operation. Although we did not include female coaches, it was quite evident that female coaches had more such problems with their athletes than the male coaches. If we suppose that women coaches can also be characterized by a professional orientation,[18] one would expect them to have more conflicts since females are less professionally-oriented than males from the sixth grade on. With more play-oriented athletes on their squads, the professionally-oriented female coach would encounter more conflict situations.

Conscience Orientation Conflicts

In 1975 a paper on the Psychology of Sportsmanship proposed that a model of conscience orientation could be applied to ethical and moral aspects of conduct in athletics.[19] The approach was modelled after that of McCord and Clemes and proposed that ethical decisions in athletic situations could be characterized by either a Normativist or an Integratist conscience orientation. Normativists hold that moral soundness must be judged by the action itself. Integratists hold that the moral soundness of an action must be based upon the result of the action. The difference is great and apparently influences both coach and athlete a great deal.

Imagine two universes. One universe is composed of actions conducive to winning. The other universe is composed of ethical and moral principles which may be below normal consciousness but which can be assessed. There are some sport practices which are conducive to a success strategy (winning) which do not conflict with any prescriptions for conduct guided by ethical and moral codes. Fouling in basketball, for example, is unethical and at the same time not usually considered conducive to a success strategy. Players attempt diligently to avoid fouling out, do not start a fight at the opening jump ball, and do not run out and kick the official as they are introduced. Such actions which are prescribed by an ethical strategy for conduct, then, are not in conflict with a success strategy.

However, for some actions there is a conflict, i.e., an action conducive to a success strategy is in conflict with conduct prescribed by an ethical-moral code. Intentionally fouling the player going in for the game-winning lay-up shot is a sound success strategy, but seemingly violates the ethical code prescription which calls for playing according to the rules and a prescription against intentional fouling. But the intentional foul cannot be unethical because it is necessary for success.

The Normativist who evaluates the intentional foul in this case would judge the moral soundness based upon the action itself and conclude that the intentional foul was unethical. The Integratist, however, sees nothing, or very little, wrong in an intentional foul if it contributes to achievement of the goal of success. The Integratist would not intentionally foul unless it was beneficial to a success strategy. The Normativist would never intentionally foul simply because it is against the rules. The Integratist conscience orientation, of course, has many elements in it suggestive of the win-at-any-cost syndrome.

Unfortunately, neither coaches or athletes customarily evaluate sport practices on a good-bad moral basis, only on a success-strategy basis. Such conduct is without a conscious conscience orientation. When a sport practice is subjected to moral evaluation, judged by its appropriateness on a moral basis, a revelation often occurs in both coaches and athletes. A sport practice is suddenly seen as contrary to the conscience orientation.

Many of the concerns our coaches expressed could be viewed as conscience orientation conflicts. A coach figures out ways in which conditioning or skill practice can be conducted before the official start of the season. It has to be done because others are, or may, be doing it; this is an Integratist rationale. The coach is forced to overlook improper behavior by the star player, behavior which would be reprimanded in other players less important to the success of the team. Such compromises with the unseen universe of ethical and moral values trouble coaches, often subconsciously. Their conduct is not immediately guided by a conscious conscience, but the conscience is still there and active. The coach is merely uncomfortable or troubled by many decisions to expedite success, but the troubled coach is aware of being troubled, just not aware of why he is troubled.

Coaches are able to tolerate some practices in the gray area by invoking an Integratist conscience orientation. But even the more dominant Integratist who also has a professionalized orientation toward play eventually agonizes over the many decisions and actions that conflict with a Normativist conscience orientation.

Reducing Competitive Stress

There are as many remedies available in the drug store as there are ailments in humans. Television commercials even educate us about ailments we never knew existed, and then convince us we have the ailment. There is an axiom in medicine: if there is more than one cure, there is no good cure. The same is likely to apply to the remedies proposed to reduce precompetitive stress in athletes. It should be noted from the list of stress-reducing techniques that most of the remedies are for the symptoms of precompetitive stress (see Table 9) and not remedies for the causes of precompetitive stress.

Table 9. Stress reduction techniques.

- relaxation
- detachment
- self-understanding
- mental rehearsal
- auxiliary ego
- over-learning
- skill emphasis
- systematic schedules
- individual rituals

Values

Beyond these "fix-it" remedies which primarily focus upon the result of stress rather than the causes, there is another consideration, a consideration that suggests that we need to re-think, and re-establish, the inherent values in competitive athletics. This paper has presented both data and arguments suggest-

ing that the major contributors to competitive athletic stress include:

1. *Aggression,* and the emphasis upon winning which seems to be a catalyst for the coaching of, and acceptance by, athletes of a reactive aggression set which views the opponent as an enemy to be hated.
2. *Fear of failure,* the subconscious fear that ties losing to shame and embarassment rather than disappointment.
3. *Professionalized attitude toward play* which inclines an individual to value fairness as less important than performance and success.
4. *Conscience orientation* in which the success goal compels coaches to make decisions about acceptable conduct which are often in conflict with the individual's non-conscious conscience orientation.

These global clusters of causative factors of competitive stress have one thing in common: the disgrace of losing. It may not be the high value placed upon winning that is the primary source of competitive stress, but the stigma attached to losing. The public and the mass media contribute to the problem by defining success in narrower and narrower terms while defining losing in broader and broader terms. In swimming, for example, winning the NCAA finals or an Olympic gold medal is not really a victory unless a record is broken. Sport commentators will be asking the winner, "Do you think you failed to break the record because. . . .?" A collegiate basketball coach is faulted by the media for having been in the NCAA finals four times without winning the championship. Such a fixation upon making success more and more exclusive may eventually find that only the undefeated, untied, national and world champion with a record breaking performance can claim success. All others will be losers.

The positive outcomes of the loser must be given more attention. Competition provides a standard of excellence against which one can judge personal skill, mastery, progress, and achievement. Losing can reinforce the commitment to hard work, and demonstrate how much more performance excellence can still be achieved. Isn't it more important to get better than to be the best? Is any athlete so bad that the athlete shouldn't even try? No one can do more than compete, and if the performance isn't perfect, the effort can be. If the effort was 100 percent, the success was 100 percent. Are such notions the whinings of a loser?

John Wooden was a reasonably successful basketball coach and said:

> When the game is over, I want your head up. And I only know one way for your head to be up—and that is for you to know that you did your best. This means the best you can do. That's the best; no one can do more. You make that effort and your head will be held high.

And what about Knute Rockne? In a letter sent to Coleman Griffith at the University of Illinois in 1924 Rockne said:

> I do try to pick men, who like the game of football and who get a lot of fun out of playing it.
>
> . . . I try to make our boys take the game less seriously than, I presume, some others do, and we try to make the spirit of the game one of exhilaration and we never allow hatred to enter into it, no matter against who we are playing.

In his book, *Coaching—the Way of the Winner,* Rockne said:

> I believe a lot of our alumni, much more than our student body, are taking the game of football a little bit too seriously.[20]

Winning the game is not important, although interesting.

But losing has another potential value that winning does not, a value which is important and self-evident, but seldom acknowledged. The literature of self-disclosure[21,22] shows that the degree of friendship can be assessed by how much we disclose about ourselves to others. It is when we reveal our deficiencies to one another that we develop the strongest bonds of friendship. Thus, the person who knows the most about your inadequacies and foolish fears is probably your closest and most trusted friend.

Losing is that kind of experience. In losing we disclose to each other our inadequacies, our failure to achieve a goal to which we had

committed ourselves, and that is a very personal self-disclosure.

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2

Mental Preparation for Peak Performance in Swimmers

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Beginning in the fall of 1979, a mental training program was initiated with the University of Iowa varsity men's swimming team. The first contact and invitation came from the coach, who discovered that a comparable program had been developed the previous year with the University of California-Berkeley men's swimming team. The fact that the Cal-Berkeley team won the NCAA championship that year was probably instrumental in the coach's decision to have a similar program for his team. This paper describes the design, development and results of this program.

I experienced a variety of difficulties in designing this year-long training program for athletes. The first difficulty encountered was a personal lack of training and knowledge in the area. Years of working in therapy with psychiatric patients somehow did not seem relevant. To combat this, I frequented the library and read everything I could find that would be helpful. A second difficulty involved finding others who have already been there, so to speak, and who would be willing to share their knowledge with me. To my dismay, I discovered that the people I found who had been active with athletes were relatively closed-mouthed about what they were doing. What I finally concluded was that I was on my own, that no one was going to help me, and that what lay ahead was both a challenge and a large creative venture.

A third difficulty that I encountered was my relative unfamiliarity with the sport of swimming, with the day-to-day details of what a swimmer goes through in training, and with the limited information about the individuals who comprised the team. I am now embarrassed to admit that I had seen no more than two swim meets in my tenure at Iowa. I found myself faced with what I considered to be a problem of community entry. I was the outsider attempting to make a place for myself and attempting to make a contribution when nobody was exactly sure what I had to offer. My solution to this dilemma involved scheduling interviews with each of the swimmers at the beginning of the season, partly to familiarize myself with them, partly to familiarize myself with the program, and partly to find out from them what contribution they thought I could make. I was able to gradually formulate some basic assumptions which later became the foundation of the project.

Basic Assumptions Underlying the Use of Psychology with Athletes

1. *Every human being possesses considerable unrealized potential.* One of my favorite quotations is from Herbert Otto to the effect that the average human being realizes no more than 5% to 10% of his/her potential. The implication of this assumption is that all of us, including athletes, are capable of doing much more than we have previously done.

2. *Every human being limits himself/herself in a variety of ways.* Many of these limits are beyond awareness. These may be limits through attitudes, thought processes, previous experiences, habits, routines, or belief systems. Each person has been programmed in a certain way by significant others and by significant life experiences. This programming leads to a particular self-concept and to notions about what one can and cannot do. A further implication of this assumption is that we have a tendency to get in our own way, which makes it more difficult to tap into the potential that is there.

3. *Athletes are striving to do their very best.* If they are falling short in some respect, it is because they are lacking some necessary skills. If they knew how to do better, they would. There are two implications of this assumption. The first and very necessary one is that athletes and people in general are committed to the pursuit of excellence. If presented with a path which presents to them a reasonable likelihood of attaining excellence, they will pursue it. There also is an indication of the possible role or function of the sport psychologist, that his/her task with a team is to help people develop or explore their untapped potential by teaching them psychological skills which they may be lacking or by offering options or alternative ways to achieve their goals.

4. *People don't really know how to go about releasing their potential, but it is possible for them to learn and ultimately they have to do it for themselves.* People must be responsible for themselves and learn to manage their own lives. I view the sport psychologist basically as an educator or re-educator teaching psychological skills which will lead to enhanced performance. The athlete who has been exposed to these psychological skills is responsible to make the application to the competitive situation and to develop his/her own mental approach to the sport.

5. *The mind affects the body in both negative and positive ways.* The field of psychosomatic medicine has known about the interaction between the mind and body for years. It is now well accepted that emotional factors contribute to a wide range of physical ailments and diseases. But until recently, we have neglected the opposite side of the coin—the positive effects of the mind on the body. For a long time, we even lacked a name for this influence. Recently the terms holistic health and holistic medicine have been coined. The basic concept underlying holistic medicine or holistic health is that the development of the whole person must be considered at all times. I see the discipline of sport psychology as moving along hand in hand with holistic health.

6. *What goes on inside the head is critical to performance.* One's thoughts do matter. We are what we think we are. We are able to do what we think we are able to do. We become what we think we will become. We are not able to do what we think we are not able to do. This is the art of positive thinking. So much then becomes a question of right thinking and right attitude or one's mental outlook or mental perspective. What I think and what I feel about myself and about my own abilities determine what I am able to do. I am constantly in the process of creating my own reality which I then use to support and reinforce what I think I am capable of doing. What limitations we do possess are more likely to be mental limitations than physical limitations.

7. *Development of the mind and exercise of the mind is equally as important to peak performance as is the development and exercise of the body.* Most athletes with whom I have talked will readily agree that success in their sport is 90% dependent upon mental attitude. We all realize that we are a mind and we have a body until it comes to training and practice as preparation for competition and performance. Then, the mind is neglected and emphasis is placed on the development of the body. Athletes have only recently been encouraged to spend time in mental training on a regular basis. It seemed to me that the ideal training program would involve development of both the mind and the body and would seek increased harmony between them.

8. *Everything is a matter of energy.* There is no opposite to energy. This is because there is nothing that is not energy, including ourselves and everything we think. Thinking consumes,

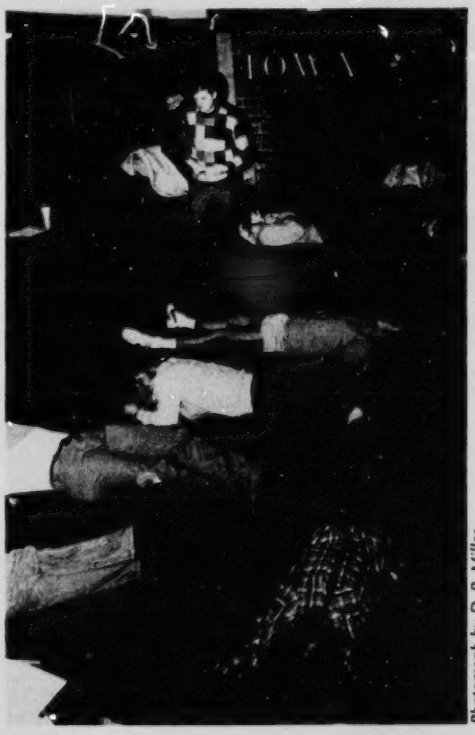
creates, and converts energy. Since energy is an influential force, and our thoughts are energy, we can alter tangible objects and alter the course of events to come. Learning how to develop, summon, and use energy then becomes a critical skill to learn.

Details of a Mental Training Program

The basic format of the program involved meeting with the entire team regularly, first on a three-times per week basis and later on a two-times per week basis for 30-45 minutes per session. Participation was voluntary; those who did not consider this of value or who preferred to spend the time in other ways to become better swimmers were allowed to do so. To their credit, the athletes were open-minded enough to give me a chance. I must admit, however, that not all were whole-hearted supporters nor active participants in the sessions. Following the presentation of each mental component or psychological skill, ample opportunity was provided for the athletes to practice in the sessions via planned exercises and activities. Also, encouragement was extended to practice as much as possible between meetings. The blend of the average session was about one-fourth to one-third didactic or cognitive and two-thirds to three-fourths experiential with me directing the swimmers in activities related to the skill we were then practicing. The major components of the program included the following in approximately the order listed.

1. *Team building and team unity sessions.* Even though these athletes spent a lot of time together in the pool and in the locker room, they did not really personally know each other. It is common practice at Iowa to divide the team according to swimming speciality areas and to have separate assistant coaches for each of the groups. Some of the athletes knew very little about other swimmers outside of their own speciality groups. Although swimming is conceived of as primarily an individual sport, we have attempted to play up the team aspect and to capitalize on the concept of a support system. The usual look of these team unity sessions involved dividing the team into a succession of dyads who talked with each other about various questions or topics suggested to them. Some of the topics related to personal issues, and some related to team and sport-related issues. We started with a heavy dose of team building and this focus remained throughout the entire season. Periodically, possibly on the average of once every 6-8 weeks, a team unity session was held in which the team members would either talk to each other or talk about matters of mutual concern. These sessions were also used to discuss preparation for upcoming meets or to debrief recently completed meets.

2. *Training in emotional control with particular emphasis on management of anxiety, tension, and nervousness.* Relaxation training seemed to be the place to begin because so many of the skills to follow require the ability to relax both the body and the mind. There are many ways to go about teaching relaxation. The literature suggests that no approach is preferable to another. I chose to expose the team to a variety of relaxation techniques including centering, autogenic training, pro-



Photograph by D. R. Miller

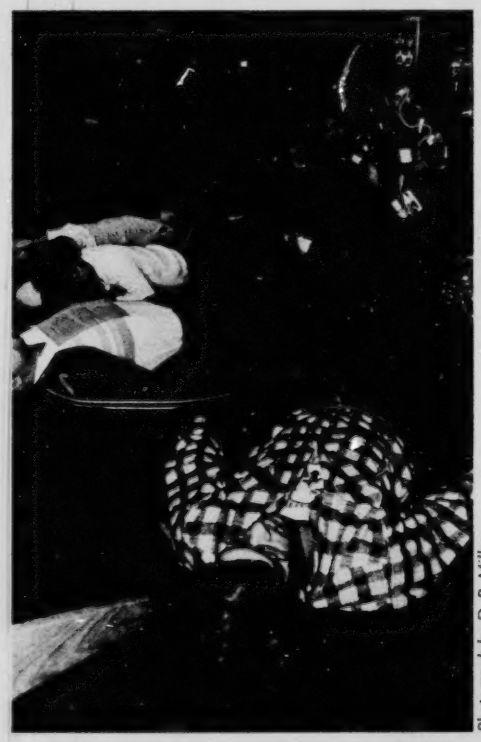
gressive muscle relaxation, breathing exercises, mental imagery techniques for relaxing, and meditation. I left it to each athlete to decide which procedure worked best for him and encouraged him to practice and develop his skill with this technique. Subsequently when relaxation was called for, I would merely request that the athlete relax through a preferred technique.

3. *Training in self-rejuvenation and re-energization as a way of combating tiredness and low energy.* During the course of a meet, swimmers will typically be called upon to swim in more than one event. All-out efforts in one performance tend to be draining for subsequent performances. In addition, swimmers train hard and work hard in the water and wear themselves down physically. Athletes must not only be presented with the principle that they have unlimited energy resources at their disposal, but also they must be trained in ways to tap into these resources.

4. *Training in attention control with particular emphasis on concentration skills.* Concentration was presented to the swim team as the ability to focus one's awareness, to be in the "here and now," to blot out or handle distractions from the task at hand, and to remove or not be enticed by competing or interfering thoughts. The primary skill taught involved focusing one's awareness either on an external object, internal processes, a part of the body, or a mental device.

5. *Training in the development and maintenance of self-confidence.* A great many studies have been done investigating differences between elite and non-elite athletes from various sports. A critical discriminating factor, which overrides talent, is self-confidence. The athlete who believes in himself/herself performs better and achieves more than a comparable athlete with low self-esteem. The battle of self-confidence is one that is never totally won. Unfortunately, how an athlete feels about himself is greatly affected by the latest performance. Athletes who have disappointing performances or who do less well than they would like are prone to self-doubt. It is therefore imperative that an athlete be able to have skills and techniques at his/her disposal so that self-confidence may be bolstered. A primary technique involved repeated self-affirmation statements.

6. *Training in visualization (mental imagery).* The varied uses of mental imagery include visualizing desired outcomes, mental rehearsal, preparation for a particular event, and stress inoculation for difficult or stressful situations. It is unfortunate that so much of our educational energy is directed toward development of the left brain and its faculties (thinking, reasoning, speaking, expressing



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oneself) while so little of our educational effort is directed toward the right brain which has nonverbal, artistic, creative, visual, and imaginative faculties. To some extent the training of visualization assists people to recapture a skill that they possessed at an earlier time in their lives and which has fallen into disuse. The swimmers seem to feel that of all the skills learned in the course of this mental training program, visualization was the most valuable.

7. *Training in cognitive intervention and ways of reconceptualizing or reframing.* The

value of cognitive intervention can be found in the management of stress and pain. Stress is not out there located in or attached to particular objects or events. There is nothing inherently stressful about getting married or taking an exam or swimming in a national tournament or giving a speech in public. Stress is located "in here;" what I make of a situation or the meaning I give it is what makes it stressful. For a period of time, psychologists talked about behavior modification as a valuable technique. More recently, I have noticed, psychologists are now talking about cognitive behavior modification. What one thinks and what one says to oneself becomes so critical in terms of what one is able to do. We have discovered that feelings are affected by thoughts and what one is able to do is affected by thoughts. Changing thoughts changes feelings; changing thoughts liberates other possible behaviors. Therefore, it is essential to be able to teach athletes the skill of manipulating their own cognitions and thought processes.

The overall aim of the entire program was to have swimmers focus on the importance of mental aspects of swimming, to encourage individualized mental training programs, to increase the consistency of the athletes' performance through greater harmony between the body and the mind, to move swimmers along in the direction of coming closer to realizing their untapped potential, and to increase swimmers' awareness of what they normally had to do to attain peak performance.

Effects of the Mental Training Program

The acceptance and use of regular mental training sessions with an athletic team is still somewhat unconventional. It is even more unusual to see any outcome data presented to illustrate the possible effectiveness of such a program. Before presenting any data, I need to indicate that this is neither a laboratory investigation nor a research study in the usual meaning of the word. This is what is termed field research and is a long way from the classic study where all independent variables are carefully controlled. I certainly do not present this as "hard" data; bear in mind that it is suggestive rather than conclusive.

Table 1 presents a review of the 1979-1980 Iowa swim season. The Iowa Swim Team accomplished a great many firsts in the course of the season and these are described in this table.

Table 1. Iowa Swim Team review of 1979-1980 season.

- First undefeated dual meet season since 1956.
- Notable dual meet victories included Indiana (defending Big Ten Champion), California–Berkeley (defending NCAA Champion) and Iowa State (first win ever at their pool).
- First time Iowa swimmers qualified for the NCAA Championship during the dual meet season.
- First Big Ten Champion in a swimming event since 1959.
- Most Big Ten Individual Champions (3) in the history of Iowa swimming.
- Highest finish (3rd) in Big Ten Championship meet since 1956.
- Most qualifiers (ten) ever at NCAA Championships.
- First NCAA All-American (two) in an individual swimming event since 1958.
- First Iowa swimmer in an NCAA Championship final (top six) since 1958.
- Most NCAA All-Americans (five) since 1958.
- Highest finish (22nd) in NCAA Championship since 1962.
- Existing school records broken in all swimming events.

Table 2 presents a review of the personal best times achieved by the Iowa Swim Team in the 1979-1980 season. Presented in this table are the number of personal best times of fifteen swimmers who did the majority of the swimming for the Iowa team and the number of different events in which the personal best times were achieved. The range included one extreme case, Tom Roemer, who had a total of thirteen personal best times; three swimmers at the other extreme had no personal best times during the season. As indicated at the bottom of the table, twelve swimmers (excluding the three who had no personal best times) attained a total of fifty personal best times in thirty different swimming events.

Table 2. Iowa Swim Team 1979-1980 personal best times.*

Swimmer	No. Best Times	Events
Roemer	13	6
Harrison	7	3
Wood	7	3
Kerrigan	4	3
Roberts	4	2
Naylor	3	3
Marshall	2	2
Rychlik	2	2
Urich	2	2
Wilson	2	2
Brask	2	1
Wisner	2	1
Bullock	0	
Graettinger	0	
Kennedy	0	

*Twelve swimmers attained a total of fifth personal best times in thirty different events.

Tables 3 and 4 summarize the results of the recent Big Ten and NCAA Championship swimming meet. Once again a large number of first place finishers were from the University of Iowa.

Table 3. A review of the 1981 season for the Iowa Swim Team.

Results of the Big Ten Meet

- First Big Ten Championship since 1936 and second in school history.
- Ended Indiana's twenty-year reign as conference champion.
- Set six All-time Big Ten records.
- Finished first in nine of eighteen events contested (previous high number of Big Ten champions was three).
- Set new school records in sixteen of eighteen events.
- Each swimmer set personal best times in every event.
- Qualified twelve swimmers and divers for NCAA Championships in twenty separate events (most qualifiers ever).

Table 4. Results of 1981 NCAA swim meet.

- Tenth place finish (highest NCAA finish since 1959).
- First NCAA champion since 1958.
- Nine of twelve swimmers and divers qualified as NCAA All-Americans (most since 1955).
- Existing school records broken in nine events (of fourteen entered).
- Set two All-Time Big Ten Records.

Another way to evaluate the range of effects of a program like this is to look at academic performance and to see whether any of the psychological skills learned were also having an effect on study habits and academic performance. Listed in Table 5 are the mean grade point averages for the entire team for the academic year before the mental training program was begun, and the academic year during which this program was instituted. As can be seen in the table, the team grade point average was quite consistent in the 1979 academic year and also comparable in the first semester of the 1980 academic year. However, during the second semester there was a large increase in the team grade point averages (3.00). The next line of grade point averages excludes swimmers who graduated from the team and did not return for the season described herein. Again, a similar pattern was noted with three grade point averages in successive semesters being almost identical followed by an increase for the ten returning swimmers to 3.04. The final grade point averages presented describe what happened with the freshmen on the team roster. Their grade point averages increased from 2.46 in the first semester to 2.93 in the second semester. Obviously, however, some of the individual results were not so remarkable.

Although I am not a believer in the value of psychological tests for screening purposes and have been reluctant to use much psychometric testing with this team, one exception was the use of the Athletic Motivation Inventory developed by Thomas Tutko. Although it has been greatly criticized, this test has been used extensively in high school and college circles with a variety of athletic teams. My purpose is not to debate here the merits of the Athletic Motivation Inventory as a testing instrument, but merely to use it in the context of measuring some changes in individual swimmers which seem to be related to basic concepts of the mental training program. The Athletic Motivation Inventory is designed to measure eleven personality variables, which are proposed to be distinguishing characteristics of elite athletes. However, one factor which gets lost in looking at group effects is that individuals within the group will change

Table 5. Mean grade point averages for Iowa Swim Team for 1979 and 1980 academic years.

	First Semester	*1979*	*Second Semester*	*First Semester*	*1980*	*Second Semester*
Team GPA	2.66	N=13	2.69	2.58	N=15	3.00
Returnees GPA	2.65	N=10	2.67	2.64	N=10	3.04
Freshmen GPA				2.46	N=5	2.93

and develop in different ways. In examining group scores, these opposite effects seem to cancel each other. Focusing on the results of the Athletic Motivation Inventory reminds us that the individual needs to be considered and individual effects will vary from person to person. What I have selected for inclusion in Table 6 are the results for four swimmers of the Athletic Motivation Inventory administered in September, 1979 and September, 1980. Here, changes can be observed which occurred in one year's time with these four individuals. Obviously I have selected them as representative of extremes of outcomes.

Swimmer K, for example, showed increases on seven of the eleven scales and Swimmer W showed increases on ten of the eleven scales. Scales which are directly related to areas of content in the mental training program and which showed increases for these swimmers include self-confidence, emotional control, mental toughness, and conscientiousness. At the other extreme are Swimmers B and S, both of whom showed decreases in one year's time. Swimmer B showed a decrease on ten of the eleven scales and Swimmer S showed a decrease on eight of the eleven scales. Rather than debating the merits of the Athletic Motivation Inventory or raising questions about test-retest reliability, what I am attempting to point out here is the same phenomenon that we have been observing for years in psychotherapy outcome research, i.e., that some individuals will show a change for the better, some will show no change at all and some individuals will show a change for the worse. This seems to be reflected in this set of data. The implication for me is that not all athletes will respond equally well to mental training and as such, it should not be regarded as a panacea for every athlete. Until we have better sorting devices for those who might benefit, self-selection and voluntary programs are definitely in order.

The Mahoney questionnaire has been commonly used as a way of ascertaining the athlete's approach to mental training.[2] The self-administered version that I have used involves 44 questions which are scored on a scale from 1 to 9, 1 being the lowest point or lack of endorsement of the item and 9 being the high point or highest agreement with the

Table 6. Percentile rank on subscales of the athletic motivation inventory.

	Swimmer K		*Swimmer W*		*Swimmer B*		*Swimmer S*	
	1979	*1980*	*1979*	*1980*	*1979*	*1980*	*1979*	*1980*
Desire	73	31	43	61	23	31	53	81
Aggressiveness	73	28	58	39	13	5	13	12
Determination	68	92	68	79	63	9	98	74
Responsibility	43	5	43	59	38	8	83	84
Leadership	33	40	83	98	43	14	63	24
Self-confidence	48	77	33	89	63	7	48	7
Emotional control	43	78	33	87	83	29	93	36
Mental toughness	13	50	8	28	78	8	78	24
Coachability	73	61	63	96	48	29	33	47
Conscientiousness	63	94	23	59	99	21	98	94
Trust	28	71	3	42	98	90	98	92

Table 7. Comparison of athletic teams' approach to mental training.

Question	*Iowa Basketball Team N=16*	*Iowa Swim Team (New) N=15*	*Iowa Swim Team (Old) N=13*
	M	*M*	*M*
Psych self up	8.00	7.73	6.76
Concentration	7.56	7.46	6.30
Think about mistakes	5.18	3.80	4.00
Psychological recoverability	3.75	4.20	4.84
Use of visual imagery	5.62	7.20	7.76
Mental practice	6.31	5.20	7.23
Replay past good performances	5.50	5.40	7.46
Olfactory in mental practice	3.25	1.20	2.15
Kinesthetic in mental practice	5.12	5.46	6.38
Visual in mental practice	6.94	7.26	8.54
Self-talk in training	8.00	7.06	7.84
Self-talk in competition	7.00	8.26	7.30

item. The questionnaire in totality samples a wide range of areas, all related to mental training. I administered this questionnaire in September, 1980, to the Iowa Varsity Men's Basketball Team and to the Iowa Swim Team. Rather than listing all of the questions, I have selected a dozen which seem to reflect some differences across teams or portions of the swim team (see Table 7). The three columns, in sequence, represent first, the Iowa Basketball Team, second, the new members of the Iowa Swim Team (following a highly successful recruiting season, which may in itself be an indirect result of the mental training program, i.e., 15 scholarship and walk-on athletes have joined the team this year), and third, the returning members of the swim team from last season who have completed one year of mental training.

The three columns in Table 7 illustrate a wide variety in experience. There was a highly successful group of basketball players, most of whom were members of the team which went to the Final Four in the NCAA last season and who were relative novices to the concept of mental training. The new members of the Iowa Swim Team were inexperienced freshmen but were not totally unfamiliar with the concepts of mental training, having received a great deal of exposure to it at some point in their athletic careers. Finally, the most sophisticated athletes, in terms of mental training, were found among the returning members of the Iowa Swim Team. The first item reflects the extent to which the athletes psych themselves prior to their athletic competition or performance. One of the concepts which I present to athletes in the mental training program is the inverted U curve which illustrates the relationship between arousal and performance. Athletes are told that levels that are too little and too high are detrimental to optimal performance. The results on this item indicate that the returning members of the Iowa Swim Team are the lowest of the groups in their tendency to psych themselves up before a performance and are noticeably lower than the basketball players in this respect. The next item relates to concentration skills. It appears from the results in this area that more work needs to be done with concentration because the basketball players are higher than the returning swimmers. It is also possible that concentration skills may be more critical to consistently good performance in basketball than they are in swimming. The next question has to do with the extent to which the athlete thinks about his mistakes. The results here indicate that the basketball players are more prone to do so than either of the swimming groups. The next question asks about psychological recoverability, i.e., the extent to which the athlete is able to overcome or rebound from a poor performance. These results indicate that the swimmers are better able to recover psychologically from a bad effort than the basketball players. The next item asks about the

Photograph by D. R. Miller

use of visual imagery. One of the components of the mental training program was teaching visualization skills and uses of visualization. The results of this item indicate that both swim groups are much more prone to use of visual imagery than the basketball players. The next two items both illustrate the variety of uses for visualization. First of all, visualization can be used in mental practice or mental rehearsal and secondly it can be used to replay past good performances as a way of enhancing self-confidence. The results indicate that the returning swimmers are much higher on both of these scores than the new swimmers or the basketball players. Again related to the use of visualization, the athletes are informed that visualization is most effective when it involves a total sensory experience including the kinesthetic, visual, auditory, and olfactory components. The next three items indicate the extent to which olfactory, kinesthetic, and visual components are included in mental rehearsal. The basketball players are highest in use or inclusion of olfactory components whereas the swimmers are highest in kinesthetic and visual. Perhaps the first is explained by the fact that there is more of an olfactory component in basketball. Many varieties of perspiration odor are prevalent in basketball, whereas in swimming the only olfactory stimulus is the chlorine in the water. The final two items relate to the use of self-talk, which is again a component in enhancing self-esteem. The questionnaire taps several uses of self-talk: self-talk during training; self-talk prior to competition; self-talk during competition. The pattern of results here is interesting, in that it reflects the fact that more experienced athletes, namely the basketball team and the experienced swimmers, are higher in self-talk during training and lower in self-talk during actual competition than the less experienced or new swimmers. Thus, it is wise to encourage athletes to talk to themselves while they are practicing or training and to turn off their internal talk process when they are competing. As a whole, the questionnaire results demonstrate differences in mental approaches characteristic of a group of swimmers exposed to mental train-

ing and a group of basketball players not so exposed.

Reflections and Conclusions

It is amazing how fast advancement can be. Less than two years ago I knew very little about sport psychology and had no experience at all working with athletes. I have now spent one season with a team and am now finishing a second. As a result of being featured in local newspaper articles, a national magazine, and radio talk shows, I have steadily been bombarded with questions about what works, what does not work, and most of all how to do it. I want to respond to the how-to-do-it questions in two ways, with some pointers I have picked up and a caution.

The following considerations seem particularly relevant for others who might want to emulate my work with their own athletes at other schools:

1. *Relationships are critical and take time to develop.* Trust and confidence do not come overnight and are most effective only if earned over a period of time. The sport psychologist must first devote him/herself to the quality of the relationships with team members. I am reminded of how cautiously the swimmers first approached me because they had been burned before by others who expressed interest in them and then did not follow through on the initial burst of enthusiasm.

2. *Support and encouragement from an enthusiastic coach are essential.* I was fortunate in that our swim coach spoke positively about the program from the first day, regularly attended the sessions indicating to the team that he expected to learn something also and demonstrated in his own behavior (decreased anxiety levels at meets) that he was benefiting as well.

3. *Athletes value personal examples.* I believe it is essential that one lead by personal example as well as by presenting concepts or skills. I have made it a point to try things out on myself first. This consistency between what I said and what I did added to my credibility alluded to under point 1.

4. *Skeptics are quite helpful, even desirable.* I do not like to work in a situation where everyone is a wide-eyed believer. Skeptics are never threatening. Instead, they provide a system of checks and balances for me and for others. Generally, the skeptics are encouraged to reserve judgment, but having experienced what I had to offer became my greatest supporters.

5. *There is a lot to learn in this area.* It seems to me that I continuously run across another book, another idea, another technique, another experience. I am quite comfortable with being a borrower and a synthesizer. The creative aspect is in the mixture I have generated.

6. *It takes quite a while for coaches and athletes to learn how to make the best use of the sport psychologist.* For a long time, despite my offer to be available and helpful, I wondered why more swimmers were not seeking my services. I finally decided that they did not know what to do with me and how to use me. Toward the end of my second season, as the team members become more psychologically sophisticated, their use of me became correspondingly more sophisticated. I really am functioning now as a mental coach.

7. *Hand-outs are valuable.* I presented a lot of lecturettes related to the covered topics. I suspect that by March, the athletes forgot what I said to them in October. Writing it down and giving them hand-outs aided considerably in retention by providing material they could refer to regularly and review.

Rolling Thunder once said something which I find applicable to many of the requests I have received: "I want to warn you not to copy me, but work out your own methods. Our people tell us to be original. If you can watch the method maybe that will give you some thoughts about what to follow, what it's all about. Then, you work out your own substance, your own songs, your own prayers and things to go with. It's not good to copy."

I think it is much too early for a young and burgeoning field like sport psychology to begin standardizing a method. I strongly suspect that what works for me may not work for you and what works for you may not work for me. There are many parameters which need to be explored before we finalize anything including the personalities of the involved

athletes, the personalities of the coach or coaching staff, and the particular sport that is involved. We need to explore a range of uses for sport psychologists and a range of intervention formats. I doubt that all of us need to spend an entire season with every team with which we are associated. Coaches are quite capable of doing some psychological training on their own. But most of all, I would not like to have others cheated of the same great and delightful experiences of being creative and original and of reaching down and learning how to develop undeveloped talents.

FOOTNOTES

[1]Tutko, Thomas, and Tosi, U. *Sport Psyching.* Los Angeles, CA: Tarcher/Hawthorne Books, 1976.

[2]Developed by Michael Mahoney of Pennsylvania State University for research with the 1976 Olympic Men's Gymnastics Team.

Coach's Reaction to Dr. Eugene F. Gauron's "Mental Preparation for Peak Performance in Swimmers"

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I applaud Dr. Gauron for his honesty in admitting his "learn-by-doing" approach to the field of sport psychology. Initially I would like to reinforce Dr. Gauron's basic assumptions with examples and a commentary of my own:

1. *Every human being possesses considerable unrealized potential.* Perhaps man's greatest burden is his great potential. One of the most exciting facets of athletics is observing a young person in the initial phases of participation in athletics and watching that unknown and untapped potential surface. The continual development of a positive self-concept and self-worth through discovering and releasing this potential is truly one of the most important benefits of sport.

2. *Every human being limits himself/herself in a variety of ways.* This has been especially obvious in the myths surrounding the female athlete. Fortunately, many of these myths are being dispelled with the rapid increase in female participation.

3. *Athletes are striving to do their very best.* Dr. Gauron states that "if presented with a path which presents to them a reasonable likelihood of attaining excellence, they will pursue it." The three major modalities by which we learn are through: the auditory; the visual; the kinesthetic. Ask yourself how you learn best. A majority of the population learns best kinesthetically or by doing. Reflect, on the way most of us were taught, i.e., through the auditory mode, the least effective way to learn. This is a key area that all teachers and coaches need to become aware of, teaching through all modalities.

4. *People don't really know how to go about releasing their potential, but it is possible for them to learn. Ultimately they have to do it for themselves.* This is extremely important. Hopefully, we are ultimately teaching life skills through athletics, one of which is to be responsible for our actions.

5. *The mind affects the body in both negative and positive ways.* For every physiological change in the body, there is a psychological change and vice versa. Reflect upon the time before a game when your excitement and anxiety caused your heart to beat more rapidly, or your palms to become sweaty. The concept of holistic health and the role of the sport psychologist certainly has ramifications for lifestyles. As we discuss the concept of "wellness," we are preparing each individual for optimum performance.

6. *What goes on inside the head is critical to performance.* This, again, reinforces the importance of focusing on the development of a positive self-concept.

7. *Development of the mind and exercise of the mind is equally important to peak performance, as is the development and exercise of the body.* It's often been said that 80% of all athletic ability is from the neck up. Thus, it is apparent that practice sessions should include mental, as well as, physical training.

8. *Everything is a matter of energy.* Life is

energy. Dr. Gauron's details of his mental training program have highlighted numerous effective points. Since it is not feasible for all athletic programs to have a sport psychologist, especially at the high school level, and in light of the numerous demands on a coach, it is imperative that we educate our coaches about psychological techniques so that they may become more effective in dealing with athletes.

Team unity is vital to all athletic teams, whether they be team- or individual-oriented. I would like to offer the practical implementation of a big and little brother/sister policy whereby a "veteran" member of the team is matched to a novice member. This approach reinforces team unity. Peer recognition fulfills one of the basic needs of all people and that is the need for affiliation.

Relaxation techniques, techniques for attention control, and training in visualization, can all be learned through the art of "focusing." A practical approach to this involves the athlete learning to "listen" to the body while doing warm-up and cool-down exercises, climbing inside his/her body, and focusing in on the stretch of the large muscle groups and feeling that stretch. This technique is also helpful in the reduction of stress.

Dr. Gauron spoke of the effects of the mental training program. I would like to reinforce his line of thought of "different things for different people." It is imperative that a coach gets to know his/her athletes and their individual arousal needs.

I would also like to address Dr. Gauron's results about psychological recoverability, indicating that swimmers are more able to recover psychologically from a bad effort than basketball players. We're dealing with an "individual *vs* team" example and in doing so, a swimmer's "speed" *vs* a basketball player's "teamwork." It is easier to measure and deal with something as concrete as time *vs* the intricasies of teamwork.

In conclusion, there exists a real need to educate our coaches with regard to the benefits of the psychology of coaching. As each athlete learns or functions best, so too, does each coach have an approach with which he/she feels most comfortable.

It is vital that all coaches know their student athletes thoroughly, by which modality they learn best, their arousal level, and their focusing abilities. Regardless of the approach, it is imperative that all student athletes receive verbal and nonverbal reinforcement.

The coach as a role model is another vital dimension. Fifty percent of all learning is through imitation, or role modeling. This is a great challenge for a coach, to be the best role model he/she can be.

The most important responsibility is the development of the individual self-concept. Once on this track, we are fulfilling our commitment to excellence.

And finally, Dr. Gauron's insistence that we continue to share information and exchange ideas is vital to the growth of the field of sport psychology. I thank Dr. Gauron for sharing his knowledge and experience, and appreciate the opportunity to react to this exciting new field.

Your living is determined
Not so much by what life brings to you
As by the attitude you bring life

Not so much by what happens to you
As by the way your mind looks
at what happens

Circumstances and situations do color
your life
But you have been given a mind
To choose what the color shall be.

3

Cognitive Somatic Behavioral Interventions in Gymnastics*

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Recently increased standards of performance and degrees of difficulty have evolved in competitive gymnastics. Likewise, the prestige and publicity accorded to successful performances has also increased. As a result, the levels of stress and anxiety with which competitors must effectively cope have also risen.

Currently, much interest is being directed to the study of the psychological strategies employed by athletes to mentally prepare and condition themselves for competition.[1,2,3,4] A number of cognitive-behavior rehearsal packages have been specifically designed for helping athletes perform up to their potential.[5,6,7,8,9,10]

This paper is based on psychological training programs developed and implemented with gymnasts ranging in age from 10-24 years representing the California State University at Fullerton Gymnastic Team and the Richmond Olympiad Gymnastic Club, Richmond, Virginia. The training programs are specifically designed for gymnasts of varying ability levels.

The program was designed and implemented at the request of and in cooperation with coaches who felt that excessive anxiety and tension were interfering with performance. The program utilizes strategies based on cognitive somatic behavioral intervention. These strategies are clearly useful to athletes in other sports but will need to be modified to meet the needs of the particular sport.

Our approach in working with student athletes is rooted in a humanistic phenomenological orientation. Thus, the individual athlete's direct movement experience is the focal point in enhancing performance. We work from the gymnast's experiential base to make the necessary changes in their gymnastic experience. The importance of individualizing the program to meet each gymnast's own experiential base cannot be overemphasized. It is, however, impossible to completely do so within the constraints of this paper.

In our approach we also emphasize that within each gymnast there is an inner athlete[11] or an ultimate gymnast[12] that needs to be discovered and allowed to grow. The fears, anxieties, and doubts that cloud this inner gymnast must be removed so that optimal performance can move from within.

Another key principle to our approach is that gymnasts have limited control of their external environment, but total control of their response to it. This implies two points: gymnasts should strive to anticipate and prepare as well as possible in order to gain as much control as possible of their external world; gymnasts can change their response to the pressure of performance.

Through effective anticipation and prepara-

*The authors would like to extend their appreciation to the California State University at Fullerton, Gymnastic Teams and their coaches, Lynn Rogers and Dick Wolfe, and to Eddie McAulley and the Richmond Olympiad Gymnastic Club of Richmond, Virginia.

tion, athletes can learn to prevent a stress response from occurring. For example, by anticipating an occasional fall off a beam during a performance and preparing an effective response, it is possible to prevent a stress response from ever occurring; but, all situations cannot be anticipated and prepared for in advance. In such situations athletes must have stress management skills which will allow them to totally change or control their response to these situations. For example, a gymnast initially responds to a situation with increased shoulder tension which could hinder or destroy performance. Through skill in stress management the athlete is able to recognize and loosen the tension to an appropriate level. This later point is basic and so essential to coping with stress in sport. There will be times when all athletes will get tense and anxious. Even the very best athletes experience excessive tension and anxiety. So it is how well gymnasts are able to cope with the anxiety and control the resulting tension level that is most crucial to maximal performance.

All of the techniques addressed in this paper complement the gymnasts' rigorous and disciplined training programs. It should not be assumed that they are intended to or could replace the physical training. It had been previously assumed that when gymnasts fail to perform up to their ability that more repetition is necessary. The approach detailed here argues that mental training plays a crucial role in maximizing performance for most gymnasts. Indeed it is the quality of practice rather than quantity or repetition alone that is crucial to optimal performance. To improve quality, athletes must become increasingly aware of the impact of their minds and bodies and be skilled at self-management.

The detailed approach will utilize cognitive and somatic approaches to behavioral self-control. Gymnasts will learn to listen to and respond to the subtle messages of their bodies and minds in an appropriate manner. Early emphasis will be placed on increasing awareness, sensitivity, and recognition of anxiety, arousal, and tension in response to potentially stressful situations. Gymnasts will be helped to clearly understand the role of self-perception in defining situations as stressful or non-stressful. Gymnasts will then learn a variety of cognitive and somatic skills including cognitive restructuring (thought stoppage, counter arguments, self-talk, imagery, etc.), relaxation training, conscious stretching, breath control, and concentration improvement techniques. These strategies have been found to be most suitable to the closed nature of gymnastic performance.[13]

The presented program consists of five specific but interrelated phases. The first phase consisted of interviewing the gymnasts to ascertain their present methods of coping. The second phase entailed providing the gymnasts with an overview of the total approach to be utilized and the rationale for it. This step is crucial to the ultimate goal of self-control. It is time-consuming but time well-spent in the early phase of the program. The third phase was to determine each gymnast's anxiety level and to discover the way in which anxiety is typically manifested. In this phase gymnasts attempted to understand their own ideal level of arousal for maximal performance in different events. Gymnasts were made aware of extreme situations where they might be too aroused and anxious as well as situations where they might be so confident they could be bored and underaroused. The fourth phase was to teach the gymnasts various techniques for coping with anxiety at differing situations and at various stages of performance: pre-meet; warm-up; pre-event; during performance; following performance. The fifth and final phase was designed to facilitate transfer of the skills taught to life experiences outside of the sport world. The intent was to provide strategies for coping effectively with stress and anxiety throughout one's life.

The Initial Interview

Some of the gymnasts had already had eight years of intense participation in gymnastics. Many had previously competed at the international level. This firm foundation provided a solid foundation from which to work. Others had very little experience.

A first task was to interview each gymnast to help grasp an understanding of their experience, to attempt to discover methods already being utilized to cope with stress, and to es-

tablish a trusting and open relationship with each athlete. Interview strategies varied from highly formalized to quite informal depending upon characteristics of each gymnast. The general format for the interview is presented in Table 1.

Table 1. Initial interview—gymnastics.

A. Establish rapport—make athlete feel comfortable.

B. Experiential base.

1. Athlete describes his/her own experiential base.
   - How long have you been competing?
   - What have been your experiences? Success? Failure? Mixed?
   - How do you explain your consistent or inconsistent results?
   - Are there situations or events that you tend to perform well or poorly?
   - Do you feel confident that you are mentally and physically preparing yourself as well as possible?
   - How does your body usually feel when you perform well?
   - How does your body usually feel when you perform poorly?
   - Have you ever thought much about the role that your thoughts, emotions, and feelings play in your performance?
2. Athlete describes past problems.
   - When you have performance problems what do you think is interfering with your ability to perform maximally? (Probe and help athlete accurately analyze the problem.)
   - Do you really have a problem?
   - Is the problem imagined?
   - Do you really have the physical skills down?
   - Do you perfectly execute in practice and then fall apart in competition? All competitions or just real important meets?
3. Seriousness of the problem.
   - How serious is the problem as far as you are concerned?
   - Does it only surface in certain situations or is it quite general?
   - Do you have any idea as to the cause of the problem?
   - Are there certain people that cause you to get uptight (coaches, teammates, parents, peers, girlfriend, boyfriend)?
   - Do you only have problems when you compete away from home and your own equipment and surroundings?
   - Are there certain competitors that upset and distract you?
   - Do you ever fear getting injured? If so, does it distract you while competing?
4. Athlete describes past peak performances.
   - When you perform real well do you have any explanation of why? (Probe and help athlete understand self.) Describe your feelings and thoughts in these situations.
   - How are they different from when you perform poorly?
   - What were you thinking and feeling prior to, during, and following these peak experiences?
   - How does it differ from your thoughts and feelings when you perform poorly?
   - Are there certain gymnasiums, kinds of equipment, or meets that help you give a better performance?
   - Do you have any idea as to why you perform so well in certain situations?
   - Are there certain people that help you to concentrate and perform well?
   - Are there particular competitors that you tend to compete real well against?
5. Evaluation of antecedent causes.
   - When was the first time you can remember performing really well?
   - Can you recall anything about that day?
   - When was the first time that you can recall feeling nervous and uptight?
   - Can you think of anything that may have caused you to feel this way?
   - What do you think is the best way to prepare for competition?
6. Comparison of problem and peak performances.
   - What do you think are the differences between problem and peak performances?
   - Is your explanation logical?
   - Is it consistent with your experiences?

- Try to recall the last time you performed poorly.
- What were you saying or thinking to yourself prior to, during, and following competition?
- Try to recall how your body felt in these situations.
- Compare these to your thoughts and feelings prior to, during, and following a great performance. Do you notice anything here?
- Do you realize that you *can* control your thoughts and feelings?
- Do you realize that your thoughts and feelings can and do either help you or hinder your performance? (If possible get a film of a great performance and a poor performance and while viewing it ask the gymnast to verbalize out loud his/her thoughts and feelings during each and note the differences.)
- Why do you think that you have failed to control your thoughts in the past?
- Are you beginning to realize their importance to your performance?

7. Intervention.
   - Today was an important first step in *helping yourself*.
   - Are *you* ready to work to improve yourself?
   - What do *you* think might be done to improve yourself?
   - Are you ready to take self-responsibility for your performances?
   - I want you to talk to your coach about what we did today and see if he/she has any suggestions. Next week we will begin to outline a program to help you.
   - Is there anything else I should find out about you before we get started? I feel we will really make some progress. Your openness and honesty are very important. It will help you know yourself better and it will help me help you help yourself better.

The interview is an essential part of the stress management program. It provides pertinent information for individualizing the program. The interview gives the opportunity to fully recognize the importance of athlete input and to assure each gymnast that his/her input is highly valued. These factors are crucial to the establishment of a trusting and effective relationship. This trusting relationship is essential to exploring the experiential aspects of the gymnast's experience.

In general it was quite obvious that our gymnasts had no prior formal training in stress management. Most had been given instructions by a coach or friend to "relax" or "concentrate."

After the interviews, a team meeting was held to discuss the program that we would use in working with them. Initially, a summary of the research on anxiety and coping and its relationship to gymnastic performance was presented. A key point was to emphasize that anxiety need not be viewed as something to overcome, but that it could function as an ally to aid one in achieving peak performance. Another essential point was to explain that each person's anxiety level may be different. Each athlete was encouraged to increase his/her awareness and sensitivity to determine individual levels. Thus, the athletes were informed that they would have to know themselves as gymnasts and that they would have to take the responsibility of coping. This session also provided the gymnasts with a personal understanding of anxiety. During the ensuing group discussion they shared various ways in which they each had previously coped. This discussion provided them with new options to consider and aided in creating team unity at a heightened level. All gymnasts now had an overview of our program and had shared their own coping strategies.

Determining Individual Anxiety Levels

Our initial task in the third phase of our program was to determine each athlete's anxiety level and the way in which it was manifested. This was accomplished by first administering objective tests to measure anxiety. A variety of relevant measures including the Sport Competition Anxiety Test, Spielberger's Anxiety Test, and Nideffer's Attentional Test were administered and scored by a sport psychologist. The second strategy was to talk with the coach to get his perception of how each gymnast manifested anxiety, e.g., nail biting, sleeplessness, yawning, edginess, stomach, tension in shoulders, giddiness, etc. It was interesting to observe that the coach's observations were similar to the outcome of the objective measures. A third technique was to

obtain the gymnasts' perspective of the way they experienced anxiety. The final method was our observation of the way they coped in simulated meet situations, and in meets of the season.

These four methods provided us with an indepth perspective of the way that each gymnast manifested anxiety and attempted to cope. It served as a base from which we could work.

Recognition and Awareness of Anxiety

Anxiety begins gradually and continues to intensify to the point where it inhibits performance. To control anxiety the gymnast must recognize it early and intervene to stop the learned response to stress. Prompt intervention is important because we have found that anxiety can often be contagious. It can spread from the coach to athletes or from one athlete to the next.

Each individual experiences the anxiety in a unique way. It may be manifested physically (tense jaw, shoulders, neck or muscle tension, shallow breathing, sweaty palms). Since the gymnasts have a highly developed kinesthetic awareness of their bodies they can learn to readily recognize the physical level if encouraged to be conscious of it. The tension can also be observed at the behavioral level (laughing, fatigue, nail biting, etc.). Videotaping is a tool that can be used to enhance the recognition on this level. On the cognitive level one must talk with the athletes to determine the type of imagery and self-talk that occurs: self-doubt; negativity; scattered thoughts (positive, self-enhancing, and self-defeating).

Each of the gymnasts were asked to observe their anxiety manifestations and report their experiences after each meet. Of course, as the season progressed the gymnasts needed to focus their attention on the performance and could not give undo emphasis to tension recognition.

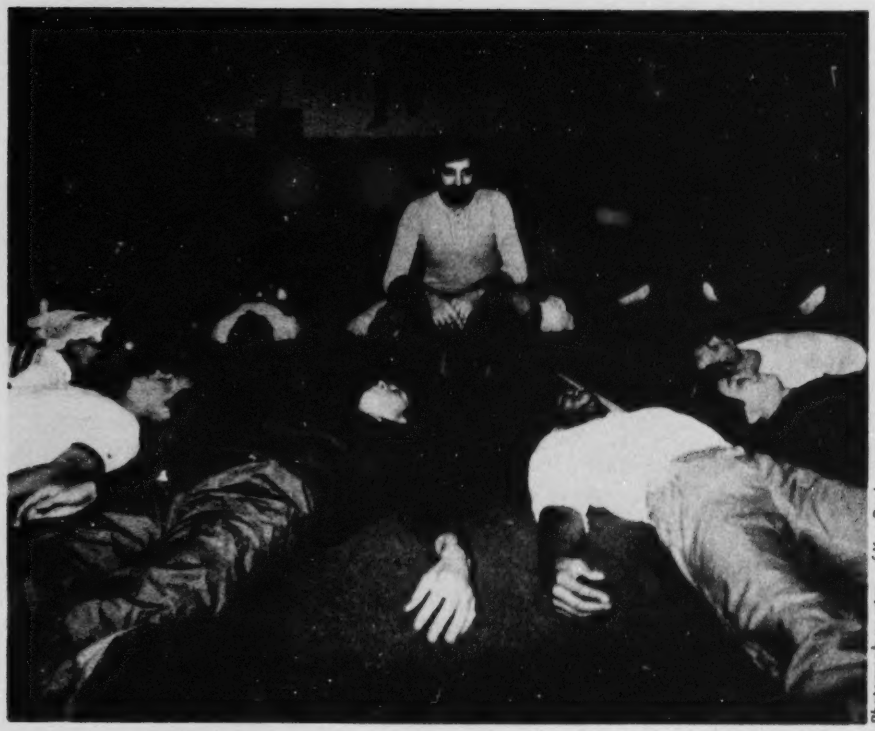
Enhancing Awareness of Stress

Awareness is the first step to changing any behavior. In our program we have incorporated two methods to aid in this recognition: development of a centered present focus; using the body as a reference point to determine the level of tension. The gymnasts must have their attention focused on what they are experiencing at the present moment. Each gymnast was encouraged to observe what was being experienced—not judge it, but just observe it. This orientation is essential because much anxiety develops from what occurred in the past (poor previous event) or expectations of the future (a difficult event ahead). When focused in the present time orientation, gymnasts can be aware and in control of their anxiety level. This present orientation is also where the gymnast's consciousness needs to remain during performance because, breaks often occur due to anticipation of future moves or being relieved at completing previous moves (getting too far ahead of oneself or behind). Bonnie Jordan, a gymnast, stated:

> It is just me and the routine; there is a complete silence. I forget time and just totally get into it. . . . It is strange it is just me and the beam. I am so into it that I do not notice anything else.

By having the gymnasts use simple breathing techniques they can pull their consciousness to the present, then observe how they are manifesting tension and determine if it is at their appropriate level. If their anxiety level is too low they can raise it, or if too high lower it.

By having the gymnasts develop this present focus it aided them in becoming sensitive to subtle messages of the body. All gymnasts worked on developing a feeling of being centered in the body and this provided a reference point from which each athlete could evolve. Initial training time was spent developing this sensitivity by working with general relaxation and then maintaining that relaxed consciousness in a standing position and eventually in a walking position. One technique utilized at this point in the program was to use a dark and quiet room and have the gymnasts slowly walk, feeling the subtle aspects of this usual non-attentive activity. This was done for ten minutes with them slowly becoming aware of the finer aspects of their



Photograph courtesy of Ken Ravizza

walking. They learned to move from this centered perspective. By developing this relaxed state of awareness it can serve as a reference point for reaching the desired anxiety level. By the time they got to the nationals or major competitions this sensitivity to an inner awareness provided a centered perspective where they could confront the anxiety of important competition.

The Importance of General Relaxation

Coaches can tell when an athlete is too tight or not properly focused and often all they can say is "relax" or "concentrate." For this reason much time was given to teaching all gymnasts how to develop specific skills to relax and concentrate. Early in the season they received training in progressive relaxation, autogenics, and imagery for the purpose of gaining self-control. Once they got control in a quiet environment, distractions were added in a graduated fashion so they could refine their skills. The premise was that an athlete needs to know how to relax in general before they can expect to relax on a balance beam in national level competition.

The general relaxation serves three major functions: it provides a reference point for managing anxiety; prepares one for enhanced imagery and visualization procedures; aids in giving the person the overall benefits of relaxation (physiological and psychological nurturing). We believe that the final rationale alone is worth the time spent because of the rigorous training schedules in which the gymnasts were engaged.

Intervention Strategies

Various intervention strategies were presented early in the season so that each gymnast could determine which methods function best for them. The information relevant to anxiety and tension manifestation, obtained by interview and questionnaire, was particularly useful for individualizing the program. For example, a gymnast who manifested tension

in the shoulders might benefit more from stretching or relaxation training than from imagery or cognitive restructuring. The essential point was to determine which avenue worked best for each gymnast's particular needs. However, emphasis was always placed on the fact that all of the techniques whether cognitive, somatic, or behavioral, have a simultaneous effect on the mind and body.

Anticipation and Preparation

An important psychological strategy utilized in our program employed a combination of cognitive restructuring and stress inoculation.[15,16] The intent of this part of the program was to anticipate emotionally distracting situations and prepare gymnasts to respond with control and concentration. Input received from gymnasts having experience in different competitive situations was crucial to the success of this part of the program.

The first step was to develop a list of situations that could occur prior to, during, and following gymnastic competition which could cause an emotional response. Typically this list was comprised of situations that really did cause particular problems for gymnasts in the past (see Table 2).

Once this list is drawn up the gymnasts practiced utilizing the strategies of thought stoppage and self-statement modification. Self-statements are determinants of emotional

Table 2. Anticipation of potentially emotion-arousing events.

Prior to Competitive Performance

Having to perform worst event first.

Competitor just before me just gives the best performance of his/her career.

Teammate just before me performs poorly.

Find out what judges are the same ones that underscored me last time I competed.

In the locker room discover that I brought the wrong uniform.

On the morning of competition the alarm fails to go off and I have five minutes to get a ride.

Today is my last chance to qualify for states or nationals.

Today my parents will see me compete for the first time in 3 years.

I will be trying a new move for the first time in competition today. I blew 2 out of 4 tries yesterday in practice.

Just before competing a coach or teammate reminds me I'm long overdue.

During Competitive Performance

I just blew my opening move.

I can feel my leotards riding up and feel uncomfortable.

Falling off the balance beam or bars in the middle of my routine.

Getting real excited about a great start.

Dwelling on a difficult move at the end of my routine.

Thinking about how embarrassed I am about my mediocre performance.

I hear the crowd booing someone else's scores while I'm performing.

Worrying that my hands are getting sweaty and slippery and I'm sure to slip off the bars.

Following Competitive Performance

Today is not going to be my day. I totally blew my first event. I'll probably blow them all.

I can't believe it—I just got beat by someone who has never beaten me.

The judges were terrible. They favored the performers with reputations.

Gosh, how can I face my parents. They have spent so much money trying to help me.

Table 3. Cognitive restructuring and thought stoppage.

Prior to Competition	*During Competition*	*Following Competition*
"My beam routine isn't as good as my teammates. I don't have any confidence. I know I'll embarrass myself."	"Gosh, I feel awful. I bet I look terrible. I bet everyone is laughing at me."	"That felt O.K. but I'm just not very happy."
"Stop" "Relax" "Think rationally"	"Stop" "Relax" "Take your time" "Concentrate" "Breath"	"Stop" "Relax" "Think rationally"
"This is my favorite event. I have done my routine perfectly thousands of times. I stay calm, and visually rehearse the routine perfectly in my head. I am prepared. I have nothing to fear. I have a great routine. I will do my best and be happy. Take my time and concentrate on what I am doing."	"O.K., great mount. Breathe slowly and now focus attention on the next move and let it flow. Concentrate on each trick as it comes."	"I did great. Look at the scores. I performed well and I scored well. I slightly missed a couple of moves. But I don't have them down in practice yet either. I must practice more. When I get them down I'll be able to compete with anyone. I'm getting there. I feel proud."

responses and they influence the efficiency of behavior in performance situations.[17] Indeed, Meichenbaum has postulated that behaviors are determined and influenced by what people say or think to themselves prior to, during, and following an event.[18]

Athletes were asked to imagine themselves in the anticipated situations, and feel themselves thinking and feeling an inappropriate emotional response. Then they were taught to repeat the word "stop" and to take a "breath" whenever they became aware that they were thinking in a self-defeating manner or feeling an emotional response (see Table 3). They were prepared to substitute a positive self-enhancing statement that they could repeat to themselves whenever they ever found themselves in the anxious situation.[19]

More Somatic-oriented Strategies

Several more somatic-oriented strategies were utilized in our program. *Abdominal breathing* was one technique all the gymnasts were trained to use, because it is so basic and is the body's natural tranquilizer. The breathing techniques were learned in conjunction with relaxation early in the season. The gymnasts were taught to associate the abdominal breathing with relaxation so that the behavior was habitual. Conscious stretching is another way to release tension. From the beginning of the season it was emphasized that when stretching one is doing more than just stretching muscles, but releasing tension as well. *Massage* also complements this physical release. Athletic trainers can assist with this aspect of the program. The advantages of these three methods are that they are basic and easy for most gymnasts to execute. These strategies were not used in isolation. They were combined with a variety of other coping strategies.

Creating a Relationship with the Apparatus

Another method used to help the gymnasts manage their anxiety levels was to take more of a philosophical orientation to their performance. The gymnasts were encouraged to move in the direction of an "I-thou" type of relationship with the event. The I-thou relationship is a concept that was developed by Martin Buber to describe those meaningful moments in a person's life where they are in union with another person. These moments have a presentness, intensity, and total involvement.[20]

Gymnasts can move in the direction of this I-thou perspective by familiarizing themselves with the apparatus (touching it, smelling it, feeling it, almost as if it were viewed as a friend). Nancy Jones, a gymnast stated that:

> I was surprised that previously I never really felt the soft quality of the balance beam. In my routine I begin with a mount where my hands are in contact with the beam. Once I touch that beam it is like the final concentration switch is turned on.[21]

No matter where one performs, the balance beam is uniformly the same. This familiarity can be used as a tool to control excessive anxiety and arousal. Dick Wolfe, a gymnastics coach explained: "The floor exercise area is a 42 foot square no matter where you are competing and it is your area to command."[22] He at times has told his gymnasts to bring an apple for the pommel horse. The point is that the athlete cannot fight the routine but must merge into it.

This I-thou relationship is stimulated in the pre-meet preparation. For example, at nationals last year the team arrived three days before the meet to become familiar with the environment. We fostered this by having the gymnasts sit in the stands and look at the apparatus and then view it from different locations and finally move to the apparatus and walk around it and experience it as more than just an object. The emphasis was to have the gymnast experience what was different about it (texture, smell, etc). They were then to look at the external factors (television cameras, color of the walls, ceiling, etc.). This was all done consciously, not haphazardly. The purpose was to become desensitized to the intensity of finals by associating with the friendly safe environment. Some team members reported that this appeared to help in managing anxiety. The technique apparently facilitated *habituation* to the environment for those who chose to use it. It must be emphasized that within our program the gymnasts were presented with many methods to manage their anxiety, but *it was their decision to determine which strategies work for them.* This flexibility is essential.

Actual National Level Competition

A variety of specific methods were incorporated into the program to help the gymnasts cope with the stress of national competition. By way of example we will focus on the balance beam (a women's event). This will be discussed in terms of managing anxiety in the following stages: *pre-meet* (three hours prior to competition); *warm-up; pre-event; actual performance.* An essential point is that the coach must take care of all coaching responsibilities, such as making certain that transportation is arranged, taking care of pre-meet eating plans and tending to other varied details. These technical factors when not properly executed can create unnecessary stress.

Pre-meet

Three hours before the meet those gymnasts that tend to be higher in anxiety, participate in a group relaxation and imagery session. The gymnast has the final choice in determining whether or not this is appropriate for his/her individual needs. To attempt to force a person to relax is impossible and potentially even stress-provoking. In the early meets they were, however, encouraged to at least try it. Often this session was found to aid the gymnasts by beginning the mental preparation that is needed in competition. It gives the gymnast a conscious method to make the adjustment from the day's events and the actual gymnastic meet. The imagery techniques (mastery rehearsal) aided the gymnasts in getting their bodies ready for the warmup period. Susan Archer, a gymnast, explained her experience with the pre-meet session:

> For me I was able to get into the state I needed to compete. I could create that feeling that I needed to perform. The imagery helped my performance because I felt like I had already done the routine once."[23]

Warm-up

The warmup period was used as an opportunity to determine the gymnasts' state of total being with respect to performance. For example, the gymnast focused on muscles that were excessively tight. Stretching was used to

bring the physical body and thought process to the centered state with which they were familiar. Achieving this centered state was a gradual process and each gymnast with time learned how to attain it prior to competition. Susan Archer explained this procedure:

> I find out where I am sore (there is a difference between muscle soreness and tightness from tension). I determine how flexible I am that day and stretch out accordingly. I then go through my routine to feel where I am tight and loose so that I can get my body the way I want it.[24]

The warm-up also gives the gymnasts a final opportunity to familiarize themselves with the apparatus and to adjust to the crowd.

Competition

The gymnasts did what was necessary to finely tune their concentration. That included imagining routines, talking oneself through the routines, executing actual physical movements on the floor, practicing breathing techniques, and prayer or meditation. As previously mentioned, these choices had been determined earlier in the season. For example, one gymnast felt she needed to go through many routines to establish the confidence she needed. So she would see herself going through six routines. Others attained the same mental state by going through one routine.

Immediately before the beam routine each gymnast narrowed her focus of attention. This was fostered by having a specific point on the apparatus on which to focus, e.g., a mark on the beam. Then, the gymnast and apparatus move in the direction of the I-thou relationship. Bonnie Jordan, a gymnast, explained:

> Right before I start, I totally block out various distractions. It's as if external things are melting away and then a silence surrounds me.[25]

Not every gymnast has this type of ability to concentrate but in the future it will be necessary for this type of concentration.

Actual Performance of Beam Routine

The first task was to finely tune the I-thou relationship; it is at this point that the ambiance was created and the "ultimate gymnast" began to emerge. The routine was almost automatic for the gymnast because it had been done thousands of times. Once the routine began, the gymnast focused on one part at a time. As mentioned earlier, this present awareness was essential because it was in the present time orientation that they make the subtle compensations in their movements to make it appear perfect. At various points in the routine there were internal focus points upon which to concentrate in order to stay "centered." For example, when a woman gymnast is doing a "flip-flop" on the beam, fear is a definite factor. Immediately before the move, the gymnast focused upon a point of concentration, e.g., pulling the thighs together. This point was usually associated with a mechanical aspect of the movement. The key factor was to make the point as specific as possible, i.e., focus upon a specific spot where she will experience the tightening of the thighs. The assumption was that if she was focused on that spot she could not be conscious of the fear as well. The specific focal point will vary among gymnasts.

Some gymnasts used sounds to focus their attention. Bonnie Jordan revealed:

> I use key words like "Jam Go, Jam Go"; I have all these words that focus me in. I will just think of the first trick and then it follows. I think of my routine as a whole and at key points I think of a sound that goes with each trick.[26]

Another gymnast focused on her breathing as she went through her event. Whatever worked best for that person was implemented. The strategy chosen was established early in the season so that the gymnast would be conscious of it as she worked the routines throughout the season. These techniques were developed by the coach and the applied sport psychologist who worked with the gymnasts in practice to determine where they placed their consciousness during the routine. The focal points were determined through

communication and trial and error. They were not left to chance.

Thus, the gymnasts were taught specific techniques on which to concentrate, to relax and to intervene on distractions at various stages of meet preparation and the actual performance. The concepts of stress management can be presented to all the team members at the same time, but the applied sport psychologist must work with each gymnast to determine which strategies work best for each individual.

The Benefit of Stress-management Skills in Later Life

Throughout the program, it was explained that the skills taught were not just limited to gymnastics, but could be used in all aspects of life where one needs to cope with stress, e.g., test taking, job interviews, childbirth, injuries, or emotional trauma. Thus the gymnast leaves the program knowing not only gymnastic movements but also coping skills that can be used throughout life.

In summary, many of the techniques and theories we have incorporated in our program were things many of the gymnasts already did. A systematic framework was added wherein the performers would be understood as a whole. Furthermore the gymnasts were taught to bring a consciousness to their performances so that they could be better prepared when meeting specific needs.

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Coach's Reaction to Dr. Kenneth Ravizza's and Dr. Robert Rotella's "Cognitive Somatic Behavioral Interventions in Gymnastics"

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The paper by Dr. Kenneth Ravizza and Dr. Robert Rotella highlights two important facets of coaching that are usually given little more than lip service by many coaches. I clearly see the material objectives of gymnastics, but I do not have a clear perspective on the psychological objectives for the gymnast, on the one hand, and for the coach on the other. Only in recent years have I come to realize that there is more to concentration than responding to the command, "Concentrate." Much more can be accomplished by asking the gymnast to "practice mentally."

As coaches, we are very concerned with the goal of facilitating the athlete's fullest potential for performance. We fail when performance in competition does not equal or exceed practice performance. Practices are not always pleasant and rewarding either for the athlete or the coach. Attitudes toward hard work are not what we, as coaches, think they should be. It is often difficult to achieve the goals we believe are important even when the talent exists. Sometimes coaching does not seem worth the effort—but it is. That is especially true now that sport psychologists are pointing toward a more humanistic coach/athlete alliance.

With this humanistic relationship the coach will have to promote goals of self-realization to make it work. The coach will have to become re-educated. Moreover, the coach will have to make major adjustments, in some cases, to create a climate that reduces unnecessary stress while creating the ability to manage stresses required for competition. These adjustments are not easily made. It takes time and a great deal of patience on the part of the coach. A psychological climate that permits talent seeking expression to flourish must be created daily, to maximize performance. This "talent" may just wither away without ever developing no matter how much one tries to nurture it with our newly-found psychology of coaching. This is an alliance, a relationship between the coach and athlete. The athlete must try to make it work.

Ravizza and Rotella point out the importance of familiarization, of getting used to an environment in all its details. This is especially important for the gymnast who must often perform complex and risky movements in a new environment with strange apparatus. Upon reflection, following a missed routine, athletes will often remark that some seemingly minor factor was responsible for the error, i.e., "the bar felt thick." Taking the time to explore a new situation from as many angles as possible while visualizing oneself in the competitive situation appears to be an easily accepted suggestion. Stress management is not so easy to accomplish. The coach is often the most stress-producing agent in the practice and sometimes, even in the competitive environment.

Visualizing performance, learnng to relax, and learning to block out interfering stimuli are techniques that are most useful for the

athlete to practice to maximize performance on any given day, However, they cannot be commanded into existence. They grow out of a very slow process of encouragement, practice, and improved knowledge. Results can sometimes be dramatic and sometimes disappointing. These psychological techniques are every bit as difficult to learn by some, as are physical skills by others. The coach must be patient and must persevere.

I can speak from experience since I spent the last seven months in a concerted effort to become versatile in stress management techniques. I was fortunate in having the assistance of a sport psychologist to handle sessions on nutrition and weight control, mental rehearsal, and relaxation. However, these concepts and techniques must be applied every day. There first must be a commitment on the part of the coach. A continuing attitude of commitment to what was earlier referred to as the goal of self-realization, should be evident in all situations and circumstances affecting the coach/athlete relationship. Growth towards independence and responsible behavior should be nurtured during practice, during competition, and during those times when the coach and athlete are engaged in other ways. As a women's gymnastics coach, I have found it especially difficult to wean my gymnasts away from certain forms of dependent behaviors. Fear of injury is a strong factor, but greater independence can be developed by gymnasts who accept responsibility for developing their own resources, such as strength.

As I continue my professional growth as teacher and coach, I look forward to continued opportunity to explore the intricacies of psychological development in sport, as well as the ever-increasing challenges presented by the technical development of the sport itself. To fully achieve success and peak performance, it will take a marriage of technical knowledge and mastery of self, both physically and psychologically.

4

Application of Stress Management in Competitive Runners

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Introduction

Sport psychologists today are expressing greater interest in the behavior of the coach and athlete, as well as a great deal of attention to the role of stress management in sport. It is really quite remarkable that in a field where stress and tension reign supreme, our control of the matter does not reach far beyond our verbal mastery of the terms. Coaches, athletes, and sport psychologists for years have been experts in "sportsugese." We talk of over-motivating, under-motivating, psyching up, psyching down, and becoming psyched out. We want the killer instinct, but we don't want the athlete to choke. We bombard our athletes with helpful words of wisdom, such as concentrate, hit, drive, relax. We plaster the locker rooms and playbooks, *ad nauseum*, with helpful catchy slogans: "When the going gets tough, the tough get going," "2 + 2 = 5" and "triumph = TRY + UMPH."

Our knowledge of the sports' jargon is astounding. We are very good at telling our athletes *what* should be done, i.e., concentrate, relax, but many times we fail to tell them why or how to do these things. We are still very naive when it comes to diagnosing factors affecting performance and prescribing strategies to enhance performance.

Models of Stress Management in Sport

Researchers and coaches have been interested in the effects of stress on physical performance since the early 1900s. A quick scan of the literature, however, reveals a new emphasis on this concept, and with that, a new wave of research has evolved. The area of stress management in sport has adapted several models for consideration in describing and changing sport-related behaviors. The earlier work of researchers, such as Speilberger,[1] Taylor,[2] Endler,[3] and Martens,[4] has given us a better understanding of that elusive variable we call stress. Two models that focus more on behavioral definition *and* change are those presented by Meichenbaum's Stress Innoculation Training (SIT),[5] and the model described by Smith entitled, the Cognitive-affective Stress Management Training Program (SMT).[6] Both of these models will be discussed and treatment strategies for stress management will be explored.

Meichenbaum: Stress Inoculation Training (SIT)

One of the complaints of modern-day coaching is that the coach imposes his will or authority on the players which results in a false sense of personal stability within the athlete. More and more coaches are recognizing the need to permit athletes to develop self-control measures that they can rely on

during competition. This is essential, because once the contest begins, the coach can do very little to intervene for the athlete. The old adage, "A coach knows he has been successful when he is not needed," has new meaning in the struggle to develop athletes who can control all elements of their own performance.

Meichenbaum's SIT program blends well into this self-control philosophy. The SIT is comprised of four basic phases. The first, the educational phase, helps the athlete to understand the many reactions stress can elicit in the body, and assists in clarifying and redefining the entire event (conditions leading up to stress, stressor, athlete's reaction, consequence of action, feedback). The second phase allows the athlete to develop self-control strategies for coping with the stressful situation. This phase includes techniques involving relaxation training and development of effective self-instructions including preparation for the stressor, confronting the stressor, handling the stressor, possibility of being overwhelmed by the stressor, and self-reinforcement. Finally, during the third phase the athlete gets an opportunity to rehearse these skills in increasingly more difficult situations, i.e., at practice, scrimmage, and game-like and game situations. The athlete's response to stress is evaluated and appropriate adjustments are made in the SIT program.

Cognitive-affective Stress Management Training (SMT)

A second model, equally applicable to sport training, has been described by Smith.[7] The Cognitive-affective Stress Management Training Program (SMT) parallels the SIT on many accounts. The SMT also emphasizes the individuality of a stress management program. Some athletes will be more effective in stress reduction via the physical modality, whereas other athletes will find greater success utilizing cognitive methods.[8] The five-step SMT program begins with the pre-assessment phase. A holistic perspective of the nature of the athletes' stress response is developed including the nature of response, antecedents, behaviors, and consequences of the athlete's action and the athlete's strengths and weakness (cognitive and behavioral) in coping with these situations. The second phase educates the athlete concerning the treatment rationale and explains the intervention options for the program. The third phase provides the skill development portion of the program. This includes the physical responses (relaxation) as well as cognitive coping skills. The fourth phase provides the opportunity to rehearse the newly acquired coping skills via imagery training. Athletes imagine increasingly higher levels of stress and the concomitant arousal and then are asked to control these feelings via the intervention strategies (cognitive, behavioral, and an "integrated coping response") learned during phase three of the program. Finally, an evaluation component is utilized to assess the program's effectiveness and to modify the program to accommodate individual needs and interests. Both of these models and the cognitive coping elements that are utilized share two common variables: the ability of the subject to control his/her thought processes; development and application of cognitive skills.

Subject's Control of Thought Processes: Initial Recognition and Control

As these two models have suggested, it is possible for athletes to gain control over their anxiety reaction. This is possible through the development of a flexible set of coping skills that are acquired through practice. If these skills are to be effective, the athlete must become more in tune with the "inner" athlete and the powerful statements this "inner" athlete generates. These messages generally take either a positive oriented view, or the form of self-doubt statements and negative thoughts concerning performance capabilities and outcomes. According to Meichenbaum self statements serve many useful and powerful functions including evaluating the results of the situation, controlling (or not controlling) negative thoughts, recognition and reinterpretation of signs of arousal, assisting the athlete in coping with fear, and evaluating and reinforcing the coping effort.[9]

Photograph by Mary Sanborn Davies

Although the uses of self statements are well documented,[10] they must first be recognized and re-evaluated to serve as coping skills rather than as an inhibitory factor on performance. To increase the level of awareness of these statements an athlete needs to become more aware of the overall (physiological and cognitive) body responses to stress. This can be accomplished for most athletes via the acquisition of relaxation skills. The development of a good relaxation response is imperative in the acquisition of a tension recognition and control responses.

The interest in relaxation is obviously not a new one. Jacobsen introduced the progressive relaxation technique and it has been used in varying forms for years.[11] The first step in this process is tension recognition. A variety of prepackaged relaxation tapes are available which verbally guide subjects through relaxation programs. These programs vary in their length (15-45 minutes) and their approach, e.g. fantasy, tension/relaxation. However, the difficulty in relying solely on the "packaged" approach to relaxation training is that the needs of the individual, i.e., attention span visual preference, imagination, etc., may be overlooked. Other options in relaxation training include verbal guidance by coach/consultant, partner assistance, combination of tape/verbal guidances and biofeedback training.

Once a good relaxation response is developed the athlete tends to become more aware of the physiological and cognitive messages the "inner athlete" is experiencing. These statements can take the form of inhibitory or facilitory self statements. A facilitory statement focuses on the desired behavior in a positive fashion. An example of a facilitory statement would be, "This serve *will* go deep into their court." Examples of inhibitory self statements are: "I hope I don't miss this shot" or "I know I'm off in my shooting tonight." Another form that these inhibitory messages take is that of negative imagery. For example, a tennis player may visualize a missed serve, or "sense" a missed volley. A related, and equally disturbing element that interferes with the self-control of an athlete involves the re-

ported distortion in the perceptual thought processes. Athletes report that these distortions generally take two forms: mind racing; a response that appears to be executed in slow motion. Typical examples that athletes have shared involving mind racing include rushing a volleyball serve, thinking of all possible offensive plays and not being able to concentrate on the ball, trying to field a baseball while the mind is being flooded with several possible plays or options and, finally, a sense of the entire scene being performed at a "Keystone Cop" pace. The opposite, slow motion responses, have been reported by athletes who have difficulty responding to the competitive stimulus. For example, the volleyball player who does not respond to the ball until it has bounced beside him/her, or the batter who swings late. All of these variables inhibit performance. Via stress management programs athletes may learn to recognize and control their responses in these various situations. The development of the relaxation response and the recognition of inhibitory messages comprise the beginning phases of a stress management program.

Development and Application of Cognitive Skills

Once an athlete is able to recognize tension there are a variety of mental training techniques that can be utilized to enhance performance. These are concerned with the elimination of the inhibitory messages the "inner" athlete generates. The majority of these techniques rely, in part, on mental practice. Mental practice is obviously not a new technique. Washburn first wrote of the phenomenon of muscular activity occuring during periods of mental imagery.[12] During the 1930s an additional surge of interest evolved in the concept of mental practice.[13,14,15,16] Interest in utilizing mental practice in motor skill acquisition began in the early 1940s[17] and has continued to intrigue athletes, coaches, and researchers for many years. Two contrasting methods of utilizing mental practice, external and internal mental practice, are pertinent to this discussion.

External Mental Practice. The first technique for mental practice requires the subject to imagine the situation from the perspective of a spectator. The athlete can envision himself/herself dribbling down the floor, can see surrounding opponents, can visualize the number on his/her back, and so on. This type of imagery rehearsal is used in techniques such as psychocybernetics.

Internal Mental Practice. The second mental practice technique requires the subject to become an active participant in the action. The subject is the performer in the image. As he visualizes himself dribbling down the court he sees only what an athlete in that situation would see.

Jacobsen noted that external imagery did not produce the level of muscular activity that internal imagery produced.[18] Support for the greater effectiveness of internal imagery in producing kinesthetic arousal has also been reported by Corbin,[19] Lang,[20] Davidson, Schwartz & Rothman[21], and Davidson.[22]

Epstein[23] further investigated the role of imagery style in a dart throwing task using four imagery tests and the "clock test."[24] Subjects were randomly assigned to an internal imagery condition (N=30), external imagery (N=30), or control (N=15) group. Thirty darts were thrown for a baseline measurement. Subjects in the two experimental conditions then mentally practiced the task using either internal or external imagery. Results indicated that significant differences evolved only between male and female subjects on dart throwing accuracy. An interesting result of this study was the evidence supporting the idea that subjects generally utilized both internal and external imagery styles. The author did report concurrences with results of Epstein and Mahoney and Mahoney and Avener[25] which suggested that negative motor performance gains seemed to be related to a dependency on external imagery. Continued research is needed in the effects of mental practice on performance. Readers are referred to a review of variables affecting mental practice by Corbin.[26]

In addition to mental practice most stress management programs include strategies to assist the athlete in monitoring self statements and in the development of positive task-oriented images and messages. Four such

techniques have played a major role in my own research: negative thought stopping; positive self statements; stimulus cueing; visuo-motor behavior rehearsal.

Negative thought stopping. Most young athletes have complained of thoughts and images of failure that flash into their minds prior to performance. These seem to most commonly take the form of negative self statements and images and negative thoughts toward others that interfere with performance.

The negative self statements are detrimental to an athlete's performance because the athlete begins to "program" himself with negative thoughts about performance, e.g., "I know I am not a good rebounder," or "I know I'll miss this shot." Some athletes envision an error in performance prior to skill execution (seeing himself/herself missing the free throw). In addition to generating negative thoughts and images regarding their own behavior, athletes allow their feelings toward a teammate to interfere with their own playing style, e.g., a player is open for a shot and does not receive the ball from a teammate, so he/she lets the thought of the teammate's incompetence interfere with his/her own skill execution, resulting in hesitation and the missing of the rebound).

Negative self statements and images interfere with performance in two significant ways: they place self-doubt in the athlete's own ability thus affecting his/her confidence; the athlete's reaction to them results in interference of concentration and skill execution. Therefore, the athlete's objective is to begin to recognize and then stop the thoughts before they interfere with performance. Thought stopping is a skill, and therefore requires regular practice. One effective technique for developing this skill is a five-step approach:

1. Begin to recognize and record the number of times negative thoughts "sneak" into your mind.
2. During relaxation practice become aware of the negative messages your mind sends, i.e., "This is ridiculous!" Stop that thought by saying NO! I can learn to relax, I just need to concentrate more."
3. Once you are relaxed, visualize a game or practice session. Observe your actions via internal imagery. If a negative thought occurs, stop it and provide the appropriate correctional thought.
4. In regular practice situations when negative thoughts occur stop the thought and provide correctional information. (Most athletes also report utilizing the technique outside of sport with good success.)
5. Begin using the technique in game situations, e.g., you are about to take a foul shot and think, "I hope I don't miss." *Stop*—"I will make this shot, I'll sink it just like I do in practice." Then visualize the shot, and execute the skill.

Positive self statements. An athlete must become his/her own best fan. He/she alone must develop confidence in his/her ability. Negative thoughts "program" the athlete for mistakes; therefore, positive thoughts can help "program" for success. Before skill execution the athlete should envision the successful execution of the skill. This serves two functions: it will ensure concentration for the task at hand, thus helping to eliminate interfering thoughts; it serves as a skill rehearsal of success. The execution of the skill can then be thought of as an instant replay of the image.

Athletes can then begin to use a combination of imagery with positive statements to mentally rehearse their skills.[27,28,29] The success of these approaches is enhanced when an effort is made to record the regular usage and outcome of negative and positive statements and positive imagery. As in any other skill, automatic usage requires regular, serious practice. Coaches need to include this aspect of mental training into their coaching sessions.

Stimulus cueing. An additional technique that has been used to assist athletes in their mental approach to athletics has been termed stimulus cueing.[30] Many athletes experience a slight shift in focus from "thinking" about the ball, to "watching" the ball. For example, a common problem in volleyball is the slowness of players moving to meet the ball on the return of service. Inexperienced volleyball players often engage in, not only non-task-related and negative thoughts ("I hope I don't miss the ball"), but also do not respond to the

Photograph by Mary Sanborn Davies

ball until it comes speeding over the net to them on the serve. Accordingly, to train the athlete to cue in on the ball as the server prepares to serve the ball seems to be a beneficial way to aid the player in responding quickly to the served ball. By saying to herself/himself "hit" as the ball is contacted, the body is already responding to the serve. If the player is just thinking about the ball, the response may be slightly delayed; by watching the ball on the toss, seeing and hearing it on contact, and so on, the body is already responding to the stimulus (ball) before it crosses the net.

Training for stimulus cueing can be done in many ways. One of the simplest ways in volleyball is to train athletes to utilize the techniques in practice by yelling "hit" upon contact. Another stimulus training technique would involve numbering the balls with large numbers. The server randomly selects a ball. On the toss the players yell the number and then yell "hit" on contact. So the receiving team would be yelling out, "2-Hit," "4-Hit." This will train them to watch the ball and verbally and physically respond to it before it crosses the net. Pilot studies utilizing these techniques have yielded a high rate of improvement on the number of successful receipts of service. Currently subjects are utilizing a three-step approach. First, the athlete will verbalize that he/she will successfully return the serve. Secondly, he/she will visualize a successful handling of the ball and finally, will yell "hit" as soon as the server contacts the ball.

In a recent investigation, a multiple baseline design across subjects was utilized to determine the results of stimulus cueing on intermediate level tennis players. Subjects were given 20 trials per day for 15 days. All balls were volleyed from an automatic ball server. Intervention for Subject 1 was begun on Day 5, for Subject 2 on Day 9, and for the final subject on Day 12. The intervention involved having the subject yell "hit" when the ball was delivered.

Results indicated a positive correlation between the introduction of the intervention and an increase in the number of returned balls. The multiple baseline design was chosen to control for the effects of practice during the study. Subject 1 averaged 6 successful returns over baseline and increased to an average of 14.1 successful returns during the extended interaction period. Subject 2 increased from a mean baseline rating of 6.9 to intervention $\bar{X}$ = 15.4 hits. Subject 3 increased from a $\bar{X}$ = 6.7 during baseline to a $\bar{X}$ = 14 hits during intervention. The number of successful hits across all subjects during intervention increased over 68% when compared to baseline data. In addition to the performance improvement, subjects reported greater ease and confidence when utilizing the stimulus cueing method. This technique appears to have great potential in controlling anxiety and in enhancing competitive performance.

Visuo-motor behavioral rehearsal. A final mental training technique that has recently been utilized, Visuo-motor Behavioral Rehearsal (VMBR) was developed by Suinn. VMBR is primarily an imagery rehearsal technique. The effectiveness of this procedure in anxiety management is in the pre-competitive preparation which develops a task-oriented

mind-set that the athlete can focus on during competition to increase concentration on correct skill performance. In addition, it aids in blocking out anxiety-provoking thoughts, such as negative self statements. This technique involves three basic steps: relaxation training; imagery practice; the extension of imagery to strengthen the psychological, e.g., anxiety control, heightening of mental aggression, increase concentration, or motor skills.

The relaxation program can utilize one of the many prepackaged taped programs available on the market today, or the Muscle Relaxation Exercise,[32] Progressive Relaxation,[33] and others. In addition, the combination of biofeedback training with relaxation has been reported to facilitate the acquisition of the relaxation response. Relaxation skills are comparable to any physical skill in that they require regular practice to remain effective. Accordingly, regular practice sessions must be scheduled. These can be done on the athlete's own time, but it is recommended that a notebook be kept on the relaxation sessions. Once the skills have been learned (2-3 extended relaxation sessions, 30-45 minutes per week) the regular use of short relaxation exercises every day (10 seconds-10 minutes) is necessary. The short relaxation exercises can be practiced while on a bus, before a class, walking home, and so on.

An important component of VMBR training is the practice of imagery skills. Imagery rehearsal skills are acquired through the same process as motor skills—continued quality practice. The successful performance of imagery skills provides an identical copy of a successful completion of the required motor skill, e.g., the serve in volleyball, the foul shot in basketball. Jacobsen demonstrated the effectiveness of imagery in muscle stimulation.[34,35] He was able to demonstrate that during vivid imagery experiences there is an energy expenditure or burst of muscle activity. Accordingly, vivid mental rehearsal has been found to generate muscle activity corresponding to the task.

Suinn recently compared electromyograph muscle response records of one skier under two conditions: thinking about the race; using VMBR while mentally skiing through the course.[36] No significant muscle response occurred under the first condition; however, there were bursts of EMG activity during the critical stages of the race under the VMBR condition.

The key to VMBR is to visualize the activity as if participating in the event and not to view it as a spectator. For example, in skiing it was ineffective for the subject to passively observe himself/herself going down the slope. It was more effective to "mentally ski" the course, work through the gates, turn the skis, and attack portions of the hill.

VMBR can be used to train any portion of the athlete's performance. Suinn utilized VMBR to assist a runner in reducing energy consumption.[37] Two athletes ran with a work load approximating 65% of the anerobic threshold. A twenty-minute running session was utilized. During the first ten minutes both athletes utilized approximately the same percentage of oxygen consumption. After ten minutes, the VMBR-trained athlete was instructed to use his relaxation technique resulting in a significant drop in oxygen consumption in comparison to the untrained athlete.

Noel utilized VMBR on 14 male tennis players.[38] The effects of the technique on their serves during tournament play was investigated. Subjects were divided into two groups, the control and the VMBR training group. Results indicated that the performance of tennis players rated as high ability players improved, but low ability players experienced a performance decline after VMBR training. It was speculated that VMBR training was more effective with players who have the actual knowledge of the skill required for effective mental practice.

VMBR is currently being used for several purposes: to practice correct technique; to practice strategies; to mentally prepare the athlete for competition (increase aggression, decrease anxiety); to rehearse and experience success in difficult areas of performance thus increasing confidence; to gain extra, successful practice time.

Current Research in Stress Management: Mental Imagery

Recently, two applicable studies have been

completed. The first study is rather traditional in its approach and concerns mental practice. The second is the application of stress management to cardiovascular responses in cross-country runners.

The use of mental rehearsal has been explored for years but questions regarding its effectiveness still exist. Corbin suggests that many factors affect mental practice including: length and type of practice sessions; type of task; performance abilities of subjects; sex of subject; kinesthesis; etc.[39] Although this study could not include all of these variables, the major intent was to compare the effects of three imagery styles on physical performance.

The task selected was the basketball free throw shot. Subjects (N = 45) were college students who had no previous varsity basketball experience and, for the duration of the experiment, were not enrolled in a basketball class and were not participating in community, university varsity, or intramural basketball programs. Subjects were randomly divided into five groups: control (C); physical practice only (P); imagery (I); guided imagery(GI); a combination of physical practice and imagery (PI).

All subjects received a pre-test of 10 free throws. In each case, the ball was retrieved for the subject and no correctional information was given. During the treatment phase, each subject met with the experimenters three times per week for three weeks. The physical practice group shot 15 baskets under pre-test conditions. Correctional information was given. The mental imagery subjects met at a quiet location. A description of the proper technique for foulshooting was provided for each subject. The internal imagery style was discussed at each session. Directions were given to each subject to "visualize yourself shooting the ball and successfully making the shot." The guided imagery group differed from the imagery group in two ways. Each subject was asked to imagine themselves at the foul line, and were instructed in deep relaxed breathing followed by a detailed visual image of each shot. Once the image was described the athlete then mentally shot the ball. The combination group was given the imagery instructions followed by an actual shot at the basket. All subjects "shot" fifteen baskets. Results of the pre-post performance gains can be seen in Table 1.

Results indicated that imagery and the combination of imagery with physical practice were the most successful techniques for skill acquisition. Subjects utilizing guided imagery reported that the information interfered somewhat with their concentration and they could not develop a smooth flowing image.

Corbin suggested that many variables affect imagery rehearsal; an additional consideration may be the extent of the information given to the subject in image development.[40] The majority of mental training and stress management programs use imagery techniques. As such, additional research in this area is needed to provide direction concerning type of imagery, extent of information given, sex of subject, previous experience, repertoire of skills, and a variety of other factors affecting imagery development.

Current Research in Stress Management: Cardiovascular Performance

Few reported studies have investigated the effects of a stress management program on physiological functioning. Generally, re-

Table 1. Performance gains for basketball practice techniques.

Group	*Pre-test % Shots Made*	*Post-test % Shots Made*	*% Performance Gains*
Control	27.7	28.8	1.1
Physical practice	40	48	8
Imagery	39	57	22
Guided imagery	33	45	12
Combination: P + I	22.8	45.7	22.9

search results are reported in terms of improved performance, e.g., time, points scored. An exception to this is the brief mention of a research project by Suinn in which VMBR was utilized to effectively reduce oxygen consumption rates in a female track athlete.[41] Accordingly, there is a need for further investigation into the physiological response of stress management programs. Toward this end, I have recently completed an investigation on the effects of stress management programs on cardiovascular performance. The following information briefly summarizes this investigation.

Subjects

Nine members of a university men's cross-country team volunteered as subjects for this investigation. One subject was unable to complete the program because of scheduling conflicts.

Photograph by Mary Sanborn Davies

Pre-assessment

Each subject completed a maximal oxygen consumption run on the treadmill. Heart rates and oxygen samples were collected every minute for analysis. One week later all subjects ran a submaximal treadmill test. This run was at a constant workload approximating fifty percent of each subject's maximal oxygen consumption. Heart rates were recorded each minute of the run and oxygen samples were gathered during minutes 1, 3, 6, 9, 10, 13, 16, and 19 for analysis. Following the submaximal pre-test, subject's VO_2 consumption rates were used to equate three groups for this investigation. Mean VO_2 rates for each group were, Control, $\bar{X} = 37.2$, Treatment$_1$, $\bar{X} = 37.1$, Treatment$_2$, $\bar{X} = 36.1$.

Treatment

Subjects in the treatment groups met individually with the experimenter and/or laboratory assistant twice per week for 5½ weeks. Treatment$_1$, (T_1) was modeled after Meichenbaum's Stress Inoculation Training Program (SIT). This treatment included discussion on the effects of stress during training and competition, conditions leading to stress, and the subject's reaction to stress and the consequences of the reaction. Subjects were taught cognitive coping responses to stressful situations, e.g., negative thought stopping, cueing. In addition, subjects received training in relaxation (biofeedback training was utilized). During the training program subjects utilized relaxation, coping techniques, and imagery to rehearse successful mastery of track problems. Examples of imagery themes generated by the athletes included: difficulty maintaining speed on curves; pacing problems during races; "kicking" too late to overtake the competition.

The treatment strategy for the second group (T_2) was based on Smith's Stress Management Training (SMT) program. The initial discussion with each athlete included an assessment of running strengths and weaknesses, and the athlete's ability to cope with cognitive and behavioral problems in competition. The program rationale was discussed; relaxation (via biofeedback training) and cognitive coping

responses were developed. These techniques were then applied to a series of track imagery situations. The investigator presented increasingly more stressful situations, based on intake information, to each subject, e.g., flashbacks to a disastrous performance, pre-race stress reactions, "giving up" during competition. As stress reactions developed, subjects were asked to immediately control the reaction and to use cognitive coping skills, positive track imagery, and relaxation responses to regain control.

In summary, the two treatment groups differed in the content and focus of their imagery. T_1 used a highly positive imagery approach and focused on running through the problem areas that were experienced. T_2 utilized more of a confrontation and conquest of stress approach. Negative situations were developed and subjects had to overcome their stressful reactions to these states to regain positive control of their imagery and physical responses. Following the conclusion of the treatment programs, subjects in all three groups again ran the twenty-minute submaximal oxygen consumption test. Heart rates were determined every minute and oxygen samples were collected during minutes 1, 3, 6, 9, 10, 13, 16, and 19. After the first ten minutes of the run, subjects were asked to make an extra effort to utilize their mental training techniques to control extraneous stress.

Results

Data for minutes 3-20 were statistically analyzed using a series of one-way Analysis of Variance (ANOVA). Separate one-way ANOVAS were computed comparing the scores of the three groups on the following dependent measures of oxygen consumption and heart rate: total pre-test score; pre-test score for the first half of the test (minutes 3-11); pre-test score for the second half of the test (minutes 12-20); total post-test score; post-test score for the first half of the test (minutes 3-11); post-test score for the second half of the test (minutes 12-20). Where significant over-all F-ratios were evident, a post hoc investigation of individual group comparisons was conducted via Duncan's Multiple Range Test.

Oxygen Consumption. Results of the ANOVA indicated that no significant difference on total oxygen consumption existed on the total pre-test, but that significance was obtained on the total post-test $F\ (2, 5) = 10.85$, $p < .05$. While no significant differences were found for either the first half or second half of the pre-test, significant post-test differences were found in oxygen consumption during the first half of the post-test $F\ (2, 5) = 13.72$, $P < .01$ and during the second half of the post-test $F\ (2, 5) = 7.12$, $P < .05$ (see Table 2).

Table 2. Mean oxygen consumption rates.

Phase	*Control*	*SIT*	*SMT*	*F value*
1st half Pre-test	36.41	36.75	35.87	.08
2nd half Pre-test	37.44	37.14	36.13	.23
1st half Post-test	36.17	33.16	31.87	13.72[a]
2nd half Post-test	37.35	34.37	32.41	7.12[a]
Total Pre-test	36.86	36.90	35.98	.12
Total Post-test	36.68	33.69	32.11	10.85[a]

[a]Significant at .05 level

These results were further analyzed with the Duncan's Multiple Range Test to determine the group(s) that was (were) significantly different. The *post hoc* analysis indicated that differences did exist in oxygen consumption between the control group (mean = 36.68) and the two treatment groups, Stress Innoculation Training—SIT (mean = 33.68) and the Stress Management Training group—SMT (mean = 32.11), during the post-test submaximal run. No significant differences were found between treatment groups (see Table 3).

Table 3. Duncan's Multiple Range Test for total post-test O_2 consumption.

Group	*N*	*Mean*	*Grouping*[a]
Control	3	36.68	A
SIT	3	33.69	B
SMT	2	32.11	B

[a]Means with the same letter are not significantly different at the .05 level.

Results of the *post hoc* analysis for the first half of the post-test revealed that statistical

significance was reached between the control group (mean = 36.17) and the two training groups (SIT means = 33.16; SMT means = 31.87). No significant differences emerged between treatment groups (see Table 4).

Table 4. Duncan's Multiple Range Test for first half of post-test O_2 consumption.

Group	*N*	*Mean*	*Grouping*[a]
Control	3	36.17	A
SIT	3	33.16	B
SMT	2	31.87	B

[a]Means with the same letter are not significantly different at the .05 level.

Further *post hoc* analysis of the second half of the post-test oxygen consumption rate resulted in statistical significance between the control group (mean = 36.35) and the SMT group only (mean = 32.41). No significant differences emerged between the control group and the SIT group (see Table 5).

Table 5. Duncan's Multiple Range Test for second half of post-test O_2 consumption.

Group	*N*	*Mean*	*Grouping*[a]
Control	3	36.35	A
SIT	3	34.37	A B
SMT	2	32.41	B

[a]Means with the same letter are not significantly different at the .05 level.

Heart Rate. Analysis of heart rate data also utilized the analysis of variance, and the Duncan's Multiple Range Test for *post hoc* analysis. No significant differences emerged within total pre- or post-test heart rate analysis. Differences exist only for heart rates during the last half of the post-test, $F(2,5) = 5.35$, $P<.05$ (see Table 6).

Table 6. Mean heart rate data.

Phase	*Control*	*SIT*	*SMT*	*F value*
1st half Pre-test	132.50	132.17	130.63	.02
2nd Half Pre-test	134.77	133.44	129.83	12
1st Half Post-test	136.33	124.58	123.37	2.60
2nd Half Post-test	140.88	124.44	120.33	5.35[a]
Total Pre-test	133.38	132.71	130.29	.05
Total Post-test	138.26	124.52	122.07	3.95

[a]Significant at .05 level.

Further *post hoc* analysis indicated significant differences between the control group ($\bar{X}$ = 140.89) and both the SIT group (mean = 124.44) and the SMT group (mean = 120.33). During the last half of the post-test no differences emerged between treatment groups (see Table 7).

Table 7. Duncan's Multiple Range Test for second half of post-test heart rate.

Group	*N*	*Mean*	*Grouping*[a]
Control	3	140.89	A
SIT	3	124.44	B
SMT	2	120.33	B

[a]Means with the same letter are not significantly different at the .05 level.

Discussion

Given the sample size (N=8) of this investigation, to gain any statistically significant results is encouraging. Although restrictions apply in small sample size, the potential problem of normality of population may be minimal due to the nature of heart rate and oxygen consumption data. This investigation dealt with trained cross-country runners, and as such, the process would be applicable to all runners with similar results anticipated.

Although statistically significant results are experimentally desirable, the practical significance in a study of this nature is equally important. The major practical results come from the subject feedback during and after this investigation. Although all but one runner improved over the course of the study due to the training effect of the general track program, subjects in both treatment groups reported differences in their approach to running and differences in their awareness of messages from the "inner athlete."

Both athletes in the SMT group reported considerable change in their awareness of messages from the "inner athlete."

Both athletes in the SMT group reported considerable change in their approach to warm-ups, pre-contest "mental sets," and in their practice and race behaviors. Both indicated an increased level in handling

"emergency stress" situations during competition. In addition, they reported that it was useful to be able to discuss stress as a variable that is part of competition (and can be dealt with through training) rather than stress as an expected reaction to and a part of training and competition that an athlete "learns to live with." Subjects in this group perceived the negative imagery approach, followed by positive imagery and controlled relaxation response, as the most beneficial portion of the program.

Athletes in the SIT group gave similar feedback. They generally indicated that they had utilized imagery before but that the combination of formal imagery training and relaxation resulted in changes in their approach to running. Typical examples of subject feedback from both groups include: more confidence; ability to control stress so that "little things" didn't hamper performance; increased appreciation for positive track experiences and how those can be used in stress management.

The results of this investigation are very encouraging. Not only was practical significance obtained, but statistical significance, as well, emerged for oxygen consumption and heart rate. This could translate into performance terms to aid in the development of a more efficient runner. A runner operating at a lower percent of oxygen consumption and heart rate could increase pace and/or run more efficiently over a longer period of time or a longer course.

It is also interesting to note that in addition to significant effects in overall oxygen consumption for SIT and SMT groups for the entire twenty-minute run, when signalled to begin maximally utilizing their mental training techniques over the final ten minutes, significance emerged only between the control group (mean = 112.07) and the SIT Group (mean = 97.25). In addition, for the analysis of heart rate, the only significant difference to emerge at all was during the final ten minutes of post-test, where again, subjects were asked to maximally apply their mental training techniques. This lends further support for the contention that athletes can gain mastery over their physiological response via an effective mental training program.

This investigation has raised some interesting questions concerning stress management programs. There is a great deal of need for further work to be done on a variety of variables affecting the acquisition of self-management skills. These include, at a minimum, the effects of biofeedback training, tape recorded programs versus coach led sessions, individual versus group training sessions, and an analysis of actual pre-/post-performance attainment.

Conclusions and Recommendations

The area of stress management in sport is beginning to receive much attention, primarily in popular coaching magazines. It is imperative, therefore, that research efforts be accelerated. Much research is still needed in the effectiveness of techniques already developed. With the generation of new stress management strategies, guidelines, warnings, and procedures need to be developed that the coach and the athlete can use in their pursuit of performance enhancement.

Accordingly, more controlled research will be needed in the investigation of the effects of stress management programs on physiological functioning, as well as in physical performance gains. This task is much easier said than done. It is difficult to conduct controlled research on athletes particularly when physiological variables are involved. It is difficult to identify athletes who are willing to commit the time necessary to be involved in pilot training programs. It is difficult to keep control groups from wanting to participate in the training once results are achieved. Resistance by coaches presents another problem in the selection of subjects for research endeavors. In addition to personnel problems, the development and administration of some stress management programs are costly financially and, even more importantly, are very time-consuming. It is extremely difficult for a single researcher to work with large numbers of athletes and to develop individual programs based on each athlete's particular needs. Accordingly, most research has been of a single subject or small group design. This

results in an inability to generalize the findings, difficulty in approaching acceptable levels of statistical significance, and difficulty in validating treatment strategies and packages.

All of these problems should clearly indicate the need for a new direction in stress management research. It will become increasingly more important for sport psychologists and others to increase their communications network, to begin sharing research ideas *before* the research begins, and to join together in cooperative research endeavors. This will necessitate the development of standardized treatment packages that will be tested in a variety of universities, schools, and communities across the country. Stress management programs in sport can serve as one of the first applied thrusts for sport psychology. This then is the challenge of sport psychology for the 1980s.

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Coach's Reaction to Dr. Susan G. Ziegler's "Application of Stress Management in Competitive Runners"

Edwin J. Stoch, High School Coach
Cleveland, Ohio

After 32 years of coaching five different sports with a total of 54 teams, I had the fortune of choosing Dr. Ziegler's "Psychology of Coaching" class while on sabbatical leave a winter ago. What a revelation it turned out to be! It was one of the most rewarding classroom experiences of my life. The course helped me to organize and reinforce some of the things I had discovered earlier in life. I can remember using primitive versions of relaxation exercises during my days as a member of the armed forces and throughout my athletic career. I have used stress management techniques in my health classes with very positive responses and effects.

From a reborn coach's view, a mental training program is extremely relevant. It includes formal training and practice of *relaxation exercises*, development of imagery skills for the training, pre-season, formal practice sessions, pre-game and during the contest applications, thought stopping practice to control negative self-statements images, and negative thoughts about others. These techniques work! It's as simple as that. Having coached all these years and having been a football official for ten years, I think I know and understand the typical coach working with our young people in the secondary schools and colleges. You have a tremendous task before you because the coach must first understand *himself/herself* and then be sold on these ideas.

Coaches are on continuous ego trips; the faults of their efforts are on constant public display. Because they work so hard to put out a good product, they are easily embarrassed and their self-esteem fluctuates with every performance. Consequently, personalities and overt behavior, especially during contests, may become less than desirable. I have seen many neurotic and even cruel demonstrations by coaches. Thus the first step is to get the *coaches* to learn and personally *use* relaxation exercises, so as to gain better self-control. Then they must be taught the principles of mental training, especially imagery skills and negative thought control. Only if a coach has personally used and fully appreciates the great worth of such a program, will he/she include these skills in the total coaching process with a team. What most coaches do not understand at this point in time is that this is the "edge" for which they have been searching.

About a year ago, when my coaching career was ended, I finally learned things that were practical, completely applicable, and which had very positive dimensions with a better approach to coaching. It made me contemplate a "comeback."

As fate would have it, our basketball coach decided to take a two-year reprieve from his duties so that his blood pressure could return to normal, and asked me to take over as interim coach. I had never expected to return to coaching, having felt I had had enough basketball for a lifetime. However, I accepted

the job again, solely with the idea of formally applying my "new education" to an old style of coaching.

My good fortune continued as Sue Ziegler, a sport psychologist, agreed to work with our squad in helping implement some of her theories into our training and game processes. Much to the surprise of many observers, the training worked. The more varied the application of these techniques and the greater the depth of application, the more successful we were. They truly worked!

Some of the things we accomplished:

1. Dr. Ziegler met with our squad in two sessions during pre-season practice and explained what we were *going* to do, not what we would try to do.
2. We accepted 10 volunteers, including our top 8 prospects and Sue interviewed each one setting up a Goal Statement, which included individual weaknesses and problems with basketball, immediate goals, and a step-by-step process for improvement.
3. Each participant took the Illinois Competition Questionnaire, Form A.
4. Dr. Ziegler passed out printed sheets describing the Mental Training Program and citing examples of each of the basics previously mentioned.
5. She placed a set of tapes (*The Quieting Response Training*, by Charles F. Stroeble, Ph.D., M.D.) on reserve in our library and suggested that each member of the squad listen to all of them and then settle on a personal version of relaxation exercise and practice it regularly.
6. The team kept a record of daily tensions and how these were treated.
7. Dr. Ziegler came to several practices to observe—and after practice would talk with any of the subjects who felt the need for more information, explanation, or simple reassurance.

In short summary, we experienced a divided season. In the first half, we won only 4 of our first 14 games during which time, there were numerous internal problems and players were *not* convinced that the mental training would work. To them it seemed strange and radically different from past experiences. In addition, it was surrounded by an aura of mystique. We had a critical team meeting, and as a group decided we were better than what our record revealed. We needed to win and we were desperate. We vowed to really give the mental strategies a fair try. The results were gratifying. We had previously lost three of our best seven players through injury and academic difficulties which made matters worse. However, we won 9 of our last 13 games in the second half of the season, with many outstanding examples of individual improvement, through use of the program.

In closing, please keep in mind that the coaches and athletes must be convinced of the potential for more effective performance through use of stress management and mental training. Secondly, the coaches must be believers and self-practitioners of these techniques before the athletes will give serious attention to mental training.

5

Biofeedback for Self-regulation of Competitive Stress

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Recently Elmer Green, one of the pioneers in the field of biofeedback, made the following statement:

> It is worth noting that all Olympic athletes get to the top by learning "to relax at every stroke." Relaxation after tension is necessary for success in any activity. If an athlete becomes so tense that the relaxation phase is destroyed, he or she may say that they were "psyched out." The difference between the top performers and those who never quite make it includes, as one important factor, the ability to turn off the effects of stress at will.[1]

Although Green was making a case for the use of biofeedback in a general sense, his statement is very true in the world of sport and fitting for beginning this paper on biofeedback and stress regulation in sport.

Why is it that some athletes fail to perform with the same grace and skill in competition as they do in practice? Although it is conceivable that a variety of factors could account for the above questions, one certain answer is *stress*. People from all walks of life experience a variety of stressors, such as fear of unemployment, financial insecurity, fear of failure, fear of radiation, pollution, and so forth. These are global psychological stressors and it is known that individuals react differently to them. Some individuals have the capacity to effectively cope with these stressors while others do not. Those who cannot cope with stress experience what Selye calls distress and are vulnerable to a variety of stress-related disorders.[2]

In the realm of sport, there are a few extremely stressful situations where lives are at stake, e.g., parachute jumping, autoracing, skijumping, etc. The individual not only experiences the stress of competition, i.e., winning or losing, but, also the fear that equipment malfunction or disruption in timing could result in death.

Athletes must also deal with a host of other psychological stressors such as victory and defeat, possible trade or demotion to the minor leagues, knowing that victory is essential to make the Olympic team, or winning an Olympic medal to ensure a lucrative professional contract. In addition, the athlete must also learn to cope with the compound effect of physical stress of training with all the other emotional stressors (academic competition, death of a loved one, change in work conditions, change in school, etc.). Thus, there are numerous physical and psychological stressors which an athlete must learn to handle. Success or failure may depend upon how well the athlete is trained to cope with these stressors.

What happens to performers when they experience the stress of competition? Typically the athlete responds with increased physiological arousal, i.e., increased heart rate and respiration, pupil dilation, increased flow of adrenalin, and increased blood flow to

the muscles. This response is typically referred to as the "fight-or-flight" response. In most instances, these "arousal" responses are necessary conditions for good performance; however, there is a point where too much arousal impairs performance, particularly performance which requires complex thought processes and movement patterns. When the athlete is too physiologically aroused, he/she no longer has "normal" clarity of mind, concentration, and body control. For instance, excessive arousal could raise a hockey player's heart rate, respiration rate, and oxygen consumption to the point that fatigue would ensue prematurely. It is also quite probable that over-abundant arousal will bring on excessive muscle tension and thereby interfere with normal skilled neuromuscular coordination. This theoretical relationship between optimum arousal and performance is referred to as the "inverted U" relationship. Essentially this theory predicts that human performance will increase as arousal increases to a given point; then performance decreases as arousal continues to increase. The literature, as a whole, supports this theory but only when complex skills are involved. For discrete tasks which require a brief explosive effort, e.g., weight-lifting, the relationship between arousal and performance more closely approximates a linear pattern. This theoretical explanation has come to be termed "drive theory."[3]

Another psychological construct which usually accompanies arousal in human performance is anxiety. Although there is a lot of confusion in the literature regarding this term, Nideffer considers anxiety to be the physiological change which is associated with a stressor.[4] Although we have a certain amount of trait anxiety, specific competitive situations may bring about situational or state anxiety, e.g., depression, confusion, feelings of panic, which will interfere with important attentional demands and skilled neuromuscular activity.

Too much arousal and high state anxiety generally interferes with performance. Some refer to this as "choking" or "screwing-up." The fact that many athletes cope, or learn to cope with competitive stress very well suggests that other performers can also be taught to cope with competitive stress. Learning to cope with stress has recently been termed *stress management.*

A variety of techniques have been developed and employed in an effort to teach individuals how to deal with stress more effectively. These techniques include: Progressive Relaxation Training;[5] Autogenic Training;[6] Systematic Densitization;[7] Meditation;[8] Relaxation Response;[9] Hypnosis;[10] Visuo-Motor Behavioral Rehearsal;[11] Cognitive-Behavior Modification.[12] It is important to note that all of these "stress therapies" emphasize self-regulation, that is, they teach the individual to control his or her own thought processes, musculature, heart rate, sweat response, etc.

In recent years the most exciting and widely publicized, if not most efficacious, technique for controlling stress has been that of *biofeedback.* In simplest terms, biofeedback involves the use of physiological monitoring equipment to return immediate information (visually or auditorily) about changes in heart rate, muscle tension or a wide variety of other variables. By trial and error with feedback reinforcement the subject learns to control these variables for optimal functioning. The idea that biofeedback might be a useful method for dealing with competitive stress is rather new, although speculation on this possibility existed six years ago.[13]

In this paper, the concept of biofeedback will be incorporated into the larger concept of stress management in sport. First of all, a brief history and description of biofeedback will be presented; secondly, studies utilizing biofeedback in a sport contest will be reviewed and analyzed; thirdly, training procedures or the "how" of biofeedback will be discussed.

A Brief Description and History of Biofeedback

Biofeedback is a technique wherein an individual interacts directly with a sensing device (machine) which in turn informs (feedback) the individual of moment-to-moment changes in biological function. These functions are under the control of the involuntary autonomic nervous system or the voluntary

central nervous system. The term "biofeedback" thus is a product of older terms, namely biology and feedback.

The concept of biofeedback is based upon the concept of operant learning. Behavioral changes occur in response to positive or negative reinforcement. We have known for a long time that in order to learn a voluntary skill such as typing, shooting a basketball, and even winking an eye, we need feedback regarding our performance. In fact, the great learning theorists of the past and present (Thorndike with trial-and-error learning, Hull with instrumental learning, and Skinner with operant conditioning) viewed feedback as critical to their theories of learning. This important principle of feedback, which makes learning possible, has merely been applied to so-called involuntary responses such as heart rate, brain waves, skin response, skin temperature, etc. As a result, individuals who are given feedback about these "involuntary" or subconscious physiological activities are able to learn to control them. For example, if an individual was motivated to learn heart rate control, information about heart rate would be "fed back" to him or her in the form of visual, e.g., light or TV display, or auditory, e.g., pitch and loudness of a tone, feedback. After several "learning" trials the individual should be able to voluntarily control his or her heart rate.

The exact genesis of the current public and research interest in biofeedback is difficult to pinpoint exactly. In reviewing the historical literature on biofeedback related phenomena, it seems as though the discovery of present-day biofeedback was a result of a flowing together of electromyographic (EMG) research, electroencephalographic (EEG) research, and operant conditioning research.

Electromyographic (EMG) feedback had been practiced sporadically since the discovery of EMG techniques in the 1920s, but it was not until the individual motor unit work of Basmajian that a surge in biofeedback research was noticed.[14,15] The initial interest was in describing the normal mechanisms of motor control and applying this information for treating neurologically and orthopedically handicapped patients. In the midst of his work Basmajian found that when subjects were provided with instant visual and acoustic feedback of the EMG signals arising from in-

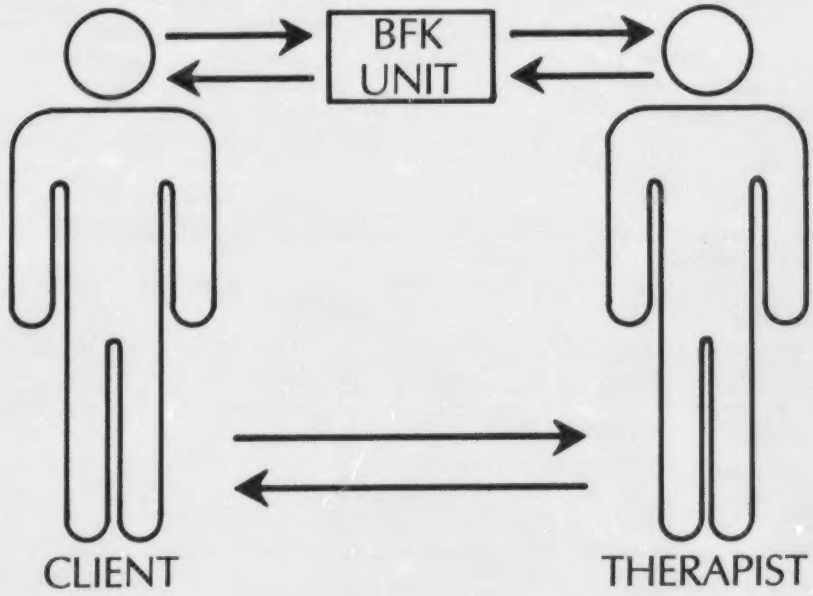

Figure 1. The biofeedback system interacting: client; therapist; machine.

visible and unfelt contractions of their muscles, they could learn to perform elaborate "tricks" with the smallest units of muscle, the motor unit. This finite control is probably an inherent factor in world-class athletes. As such, the application of biofeedback to enhance motor control in anxious athletes is obvious.

It was perhaps Neal Miller's article in *Science* which did the most to start inquiry in the field now known as biofeedback.[16] Miller and his colleagues at Rockefeller University conducted a series of operant conditioning experiments on laboratory rats and were able to demonstrate that the animals were capable of controlling involuntary visceral responses (heart rate, blood pressure, and renal function). This study disproved the idea that the autonomic nervous system was conditioned only by classical or Pavlovian conditioning. Soon numerous laboratories were demonstrating that humans could also voluntarily change their heart rates (up and down), increase and decrease blood pressure, and increase and decrease blood flow to the extremities. Since that time, researchers have demonstrated voluntary control of heart rate during exertion.[17]

About the same time that Miller was engaged in his operant conditioning research, two other laboratories were conducting biofeedback research which helped propel the concepts of biofeedback to its current status in the field of psychophysiology. Elmer and Alyce Green at the Menninger Foundation in Topeka, Kansas, demonstrated that they could teach anxious subjects to alter blood flow in their fingertips by monitoring skin temperature obtained from tiny thermisters fastened to the skin. This work eventually led to the conclusion that conscious control of blood flow was possible and represented a breakthrough for athletes and coaches concerned with controlling pre-competition anxiety.

At the University of Colorado, researchers Thomas Budzynski and Johann Stoyva reasoned that if one received information about the level of tension in a given muscle, then it should be possible for one to utilize this feedback to alter the tension. Budzynski and Stoyva tested this hypothesis using clients who experienced tension headaches.[18] The researchers first developed EMG feedback instrumentation then demonstrated that when subjects were taught to reduce tension in the frontalis muscle, they not only could eliminate their headaches, but could invoke generalized relaxation in other muscles of the body. This generalization phenomena has since been questioned and may only be feasible in very astute learners in a somatic sense. Athletes appear to have great potential herein.

Since this initial inquiry into biofeedback there has been enormous growth in the field. Studies on theoretical and applied aspects of biofeedback have appeared in major journals representing the disciplines of psychology, physiology, education, medicine, dentistry, and others. Two professional societies, the Biofeedback Society of America and The Society of Biofeedback Clinicians have been formed and they publish their own journals, *Biofeedback and Self-Regulation* and *American Journal of Clinical Biofeedback*, respectively.

Many different modalities of biofeedback have been developed and are currently in use. The most widely researched and applied modalities include:

1. *Muscle feedback.* Detects activity of muscle and has principally been used for relaxation training, desensitization, tension headaches, and muscle rehabilitation.
2. *Thermal feedback.* Detects peripheral skin temperature and has demonstrated to be useful for relaxation training, migraine headaches, and vasoconstrictive disorders.
3. *Electrodermal biofeedback.* A term which refers to feedback obtained from electrical activity at various skin sites. Presently there is a proliferation of terms and general lack of consensus regarding the measurement of electrodermal activity. The numerous specific measures include galvanic skin response (GSR), skin conductance response (SCR), skin resistance response (SRR), skin conductance level (SCL), skin resistance level (SRL), and skin potential response (SPR). Electrodermal feedback has been used to teach relaxa-

tion and as an adjunct in therapy, e.g., systematic desensitization.

4. *Cardiovascular biofeedback.* A variety of relatively simple sensors, e.g. electronic, mechanical, or plethysmographic, have been utilized by researchers and clinicians to provide feedback about heart rate and blood flow. Studies have shown that subjects can decrease and increase heart rate voluntarily. Presently heart rate biofeedback is being researched for the treatment of cardiac arrhythmias.
5. *Electroencephalographic feedback.* Measures brain wave activity. Has been used for relaxation training but has been found inefficient compared to EMG and thermal feedback. It is also used in treating seizures.

Biofeedback and Athletic Performance—the Research Evidence

In 1978 a Task Force of the Biofeedback Society of America attempted to determine whether biofeedback had any application to the field of athletics.[19] The Task Force reported that a handful of clinical researchers were using biofeedback in three different areas: as a technique for teaching athletes to deal with general and specific anxiety; as a means of restoring function after muscle injury; as a means for providing biomechanical or muscle feedback to athletes so that they may perfect highly skilled movements and enhance performance. The Task Force regretfully reported that their findings were primarily based on anecdotal reports and there was only one exploratory study which had any data. The 1980 update of this report shows that very little has been added to the literature in two years.[20]

Zaichkowsky[21] and Greene[22] have recently conducted more extensive literature searches on the topic. The more recent reviews have verified the three areas of application in sport and have also documented ten studies which relate biofeedback to sport. Of these ten studies, only three have been published in referred journals in North America.

Two other biofeedback studies which could be considered "sports medicine" have been reported, however, they would be categorized as dealing with the third area described by the Task Force review.[23,24] The second area of application, namely the restoration of injured muscle via EMG biofeedback is well documented in the EMG rehabilitation literature.[25]

The rationale for using biofeedback to help combat competitive stress is largely based upon the evidence collected by numerous researchers working in the mental health field. Diagram 1 portrays the consequences of competitive stress and the hypothesized effects of biofeedback intervention.

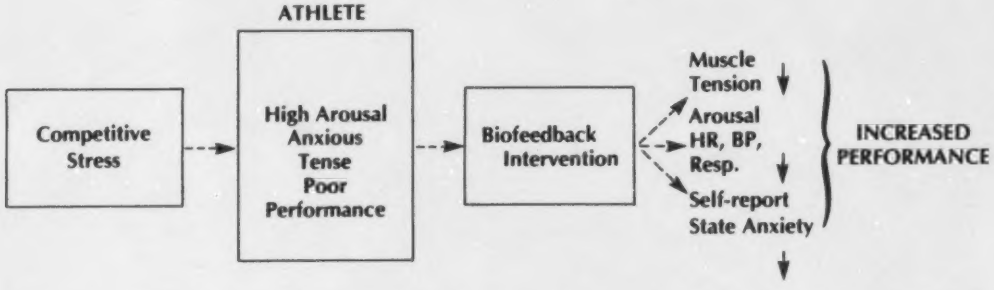

Diagram 1. Model depicting chain of events which occur with competitive stress, and subsequent biofeedback intervention. Competitive stress results in excessive arousal which leads to disruption of thought, lack of concentration, confusion, and excessive body tension. These and other responses to stress result in the poor performance which is predicted by the Yerkes-Dodson Law. Biofeedback intervention should theoretically result in decreased muscle tension, autonomic responses and self-report state anxiety. From this should follow increased athletic performance.

A total of eight studies appeared to investigate biofeedback intervention effects on motor performance based upon the model outlined in Diagram 1. Three of these studies used a laboratory task, the stabilometer, as their measure of motor performance (another used the pursuit rotor); the other five used the sports skills of gymnastics, archery, synchronized swimming, basketball, and American football.

The first of the laboratory studies was conducted by Teague.[26] Teague used both systematic desensitization and EMG biofeedback in an attempt to reduce state anxiety and improve balancing performance on a stabilometer. After providing college students with a total of four hours of treatment, Teague found his subjects were able to reduce state anxiety (although statistically not significant) and also improve balancing performance.

French likewise used a stabilometer for his measure of motor performance.[27] He hypothesized that EMG feedback training would reduce general performance debilitating muscle tension and improve balancing performance. Results of the study showed a significant decline in tension between pretesting and post-testing on the stabilometer. Associated with the lower EMG reading was a significant improvement in performance by the experimental group. French's contention was supported by his obtained coefficient of correlation for time-on-balance and concurrently scored EMG values ($r = -.60$).

More recently French reported upon an investigation which looked at the effects of EMG biofeedback on the learning and performance of a pursuit-rotor task.[28] As in the stabilometer task, subjects reduced tension and significantly improved performance.

A third study dealing with balance was conducted by Blais at the University of Ottawa.[29] Blais investigated the effects of frontalis EMG biofeedback training on sport precompetitive anxiety variables and on motor performance (stabilometer). The subjects (10-13-year old males) were selected on the basis of high scores on the Sport Competition Anxiety Test and randomly assigned to a biofeedback or placebo group. Blais reported that the EMG group significantly reduced muscle tension and that it appeared to transfer from resting conditions to a competitive setting. He concluded however that EMG biofeedback training did not enhance performance under competitive stress.

Although Nideffer[30] reported using biofeedback in a clinical setting in 1976, it appears as though the first clinical biofeedback study conducted on athletes was that by Dorsey[31] at Boston University and reported in 1977 at the IV International Sport Psychology Conference in Prague.[32] This research tested the hypothesis that EMG frontalis biofeedback in combination with systematic desensitization would be effective in reducing state anxiety and improving the performance of college gymnasts. It was found that biofeedback reduced frontal EMG activity as much as 42% from baseline. However, A-state anxiety, although lower than baseline under two different conditions of competitive stress, was not significantly reduced after training. Even though performance was improved for the treatment group on four out of six events under moderate and high conditions of stress, design limitations prevented unequivocal statements regarding treatment. This occurred because the gymnasts were not required to compete in all events, thus sample sizes for particular events became rather small. It was of interest to note that experimental subjects reported biofeedback to be helpful in managing their anxiety and perceived it to enhance their performance.

Tsukomoto likewise studied biofeedback effects on gymnasts in a master's thesis at the University of Western Ontario.[33] Tsukomoto found no differences between groups who learned to relax with biofeedback and groups that did not. One major limitation of this study was the use of subjective evaluation only. If treatment was, in fact, effective, it may have been masked by the inaccuracy or insensitivity of the performance measure.

Another study at the University of Western Ontario was conducted by Bennett and Hall on archery performers.[34] The researchers assigned novice archers to one of three groups: biofeedback-cognitive training; biofeedback single exposure; no biofeedback. EMG frontalis muscle training for group one consisted

of four ten-minute sessions, whereas group two received a single ten-minute session. Results indicated that muscle tension levels could be significantly reduced with biofeedback training. However, Bennett concluded that EMG tension levels were not accompanied by increases in archery performance. The major weakness of this study was that the training periods were too brief. As such, the method was not given a fair test of feasibility to increase performance.

Wenz and Strong at California State University in Hayward had also reported some exploratory work with elite athletes (mainly track and synchronized swimmers) using both EMG and thermal biofeedback.[35] These psychologists reported teaching athletes anxiety management by using biofeedback as well as Jacobsonian relaxation training, autogenic phrases, and imagery. Although their work to date is such that it has precluded hypothesis testing, the California researchers reported athletes developed greater "self-regulation" when they became more self-confident and improved their performances.

Recently DeWitt reported on two studies which attempted to determine whether a cognitive and biofeedback training program would help athletes reduce competitive stress reactions and improve performance.[36] In the first study six football players attended 12 biweekly training sessions of one hour. The training sessions included EMG biofeedback on either the frontalis, masseter, or trapezius muscle, as well as general relaxation training, training in visual imagery, and cognitive training. Results showed that four of the six athletes improved in game performance based upon coaches' ratings. In a second study reported by DeWitt, twelve university male basketball players were randomly assigned to treatment and contact-control groups. In addition to EMG feedback, training in visual imagery, and cognitive strategies, subjects received heart rate feedback. Results showed that the athletes were able to significantly reduce EMG and heart rate levels over 11 sessions. Furthermore, two team managers, who were not aware of which athletes were in the feedback training programs, rated the performance of the treatment group significantly higher than the control group. Additionally, the treatment subjects reported feeling more relaxed, had greater control over tension, felt "looser" during games and stated that there was a decrease in the number of minor injuries while they participated in the program.

In summary it can be said that although the general biofeedback literature clearly supports the notion that biofeedback training is a useful means of controlling stress, the limited research on competitive stress is equivocal, particularly as it pertains to performance. Performance, of course, is what coaches, athletes, and sport psychologists are all trying to enhance. Thus, it is perhaps important to point out that biofeedback studies in general, when demonstrating efficacy in stress reduction, show appropriate changes in physiological parameters and perhaps positive self-reports by subjects; however, they rarely demonstrate this impact on job performance or any other performance measure. Perhaps more research is needed to determine what aspects of human performance are enhanced when stress responses are clearly regulated by the individual. What is needed are more studies which will rigorously test the model depicted in Diagram 1. Admittedly, it is difficult to conduct "clean" field studies. One simply cannot tell a group of athletes "you are serving as the control group" in a between-subject design, and it is impossible to withdraw biofeedback-aided relaxation training in a within-subject A-B-A design. Nevertheless we can *carefully* and *systematically* record relevant and sensitive cognitive, affective, and behavioral data on individual cases, or on a single group. We can also conduct experiments using multiple baseline designs[37] and ultimately there may be conditions where it would be appropriate to use a controlled-group study.

In my opinion, biofeedback is a tool which enhances the learning of self-regulation and thus is most effective when it is used in combination with some other form of clinical or home therapy such as progressive relaxation, autogenic training, meditation, visual imagery, and systematic desensitization. That is essentially the approach I take in working with athletes at Boston University and

elsewhere. The following is a description of the procedures I use in working with athletes who wish assistance in learning to cope with competitive stress.

Biofeedback Training Procedures

1. Participation by the athlete is based upon the coach's recommendation and desire by the athlete to be a part of the training program. It is important that the coach have an understanding of biofeedback and stress management techniques. Prior to any biofeedback training there is a clinical interview and assessment. In the clinical interview we discuss such things as the athlete's athletic history, whether he or she has problems with hypo- and hyper-arousal, short and long term goals, motivation, use of cognitive strategies, coach/athlete relationships, and diet. Standardized tests which are used for assessment include: Test of Attentional and Interpersonal Style;[38] State-Trait Anxiety Inventory;[39] Sport Competition Anxiety Test.[40] These data, along with input from the coach and athlete, are used to structure individual training programs.
2. During the first session in the biofeedback training laboratory, baseline data are obtained for the following measures: frontalis muscle tension (EMG); skin temperature (thermal); skin potential (SPR) or sweating response. After collecting baseline data, the athletes are informed about biofeedback and self-regulation and its usefulness in teaching relaxation and coping with competitive stress. The three systems (EMG, thermal, SPR) are explained in detail. Emphasis is placed on the idea that everyone uses feedback to perfect their skills, and in fact, no skill can be learned without feedback.
3. It is assumed that the essence of self-regulation is proper visualization. This is true whether the person is an Olympic athlete trying to break the pole-vault record or a migraine patient trying to control blood flow. The athletes are asked to use the feedback in some way (trial-and-error) so as to reduce muscle activity, increase skin temperature, and reduce SPR activity to a specific criterion. We refer to this as multi-modality training.
4. Relaxation tapes are used to facilitate the teaching of relaxation. These tapes are a combination of Jacobson's technique and autogenic training.
5. Breathing exercises are also taught to the athlete. The breathing pattern consists of deep, but not forced, inhalations and exhalations at a constant rate.
6. During relaxation the athlete is asked to practice imagery of the competitive event while emphasizing the positive. The SPR unit is extremely sensitive and conducive to monitoring imagery sessions.
7. Home training in relaxation is suggested to the athletes. Essentially they are asked to visualize relaxation scenes and utilize strategies which effectively bring on relaxation in the laboratory. Each athlete keeps a daily diary of his/her psychological training.
8. Most athletes are able to self-regulate these modalities to the desired criteria (we use <2 microvolts of EMG activity and 95 degrees F. thermal) after about ten 30-minute sessions. However, they periodically return to the laboratory for a session in relaxation, at the same time verifying their ability to reach the criterion level of relaxation.

Conclusion

The application of biofeedback to sport is still in its infancy. However, there is strong clinical evidence and some research evidence suggesting that biofeedback in conjunction with other self-regulatory techniques such as Jacobsonian relaxation, autogenic phrases, and imagery has great promise for assisting in the psychological preparation of athletes for competition. Although there are some limitations such as adherence to practice, transfer of coping skills to competition, availability of portable instruments, and skilled clinicians, the multi-dimensional approach previously described can potentially enhance the performance of any well-motivated athlete.

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Coach's Reaction to Dr. Leonard D. Zaichkowsky's "Biofeedback for Self-regulation of Competitive Stress"

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During my first couple of years of college coaching it became increasingly apparent what a large part the mind plays in top sports performance. I have encountered numerous athletes who have had the physical ability to compete at the national level; however, they often disappointed themselves and others when the pressure of competition intensified. They did not have good psychological control and as a result, lost some physical control.

The question of what makes that competitive difference for some athletes has interested me for years. The psychological makeup of people and how they fulfill their personal growth needs, obviously play major parts. As a coach, my biggest problem is not merely helping the athlete to reach a higher physical standard, but how to help them maintain a high level of self-confidence when stress increases. For this reason I welcome the recent involvement of psychologists in facilitating enhanced sports performance.

I believe it is a *worthwhile* venture, because I view sport as one of the most beneficial of all growth experiences. There will be a variety of experiences including victory, elation, ecstasy, defeat, depression, questioning, exhaustion, sickness, health, strength, injury, frustration, personal control, flow and achievement, notoriety, rejection, friendship, happiness, challenge, aggression, risk-taking, stress, and hopefully, personal growth.

The greater the risk-taking, the larger the gain. However, in many cases the athlete who has no tools of self-control will let things happen *to* him or her rather than making things happen. For some, psychological preparation is much easier than for others. I believe that with tools such as biofeedback the athletes who lack a high degree of self-control will realize that stress management is within their personal control. The poor competitor often allows other competitors around them to dictate what he or she does. Many times an athlete can be beaten before the event even gets under way. On the other hand, it is possible to use relaxation techniques even during the most critical phases of warm-up and preparation.

Our high jumper, Julie White, was 6th in the 1976 Olympics at the age of 16. Her Canadian coach told her not to begin her approach to the bar until she had imagined herself *going over it.* Sometimes in her mind the bar comes off, so she does the jump again, mentally, until she is successful. She never jumps without picturing this success.

Mental rehearsal and mental imagery played a large part in my own Olympic preparation. While flying into Mexico City for the 1968 Olympic Games I could feel my anxiety increasing. This was the Olympic Games! The best competitors from 120 countries were going to be there! I mentally took a step back and said to myself, "This is just another track meet . . . a pretty big one . . . but just another meet." My event was the 400-meter hurdles and my Boston University coach suggested

that I focus my attention on, "It's your lane, your 10 hurdles, your pace judgment." I don't know how many hundreds of times I ran my race in my mind, but it was under every conceivable condition: different line draws; differing wind conditions; different opponents in different positions, sometimes going out faster than I; finding myself in the lead. In mentally running the race I was not just watching a movie in my head but was experiencing the sensations with my pulse rate and breathing rate increased to the point where I had to lie back down on the bed to relax and breathe deeply and slowly to lower my pulse rate again after the "run."

To further reduce anxiety of running against 32 of the best in the world, I mentally ran my top opponents in a one-on-one race. With each athlete I would run a full race where I finished ahead. If at any stage in my mental rehearsal the opponent began to pull ahead to any point where I didn't believe I'd have him by the end, I would wipe out the image and begin again until each highly respected or feared opponent would have been at least mentally conquered.

This mental rehearsal was coupled with mental imagery for stress control. At the warm-up track before the semi-final, I saw the United States athlete Jeff Vanderstock run from the blocks around the first bend. He looked powerful, fast, and graceful, and for a minute my mind was on him and wondering if I was really as fast. It was late afternoon and every day at 4 p.m. rain descended briefly with tropical intensity. This had left the infield grass wet, although still warm. I was on the infield changing from the flats to spiked shoes. In order to regain self-control mentally I left my shoes off and ran on the grass feeling the moist landing underfoot, which would take me back 13 months to the beach at Duxbury, Massachusetts, where I had started my Olympic preparation. It took me back to the sheer joy of running, flowing at high speed with the sun on my back, lifting my knees to long strides through 6" of water at the edge of the fine low tide sand. The feeling of almost limitless power and control from that time, helped me to again feel confident in my own ability. The final call for my event came up 25 minutes before the starting time. The eight men were placed in the small pen on the ramp which was 50 yards from the track. We were checked in but had to stay there for 15 minutes. Ron Whitney, the favorite from California, began jogging around. One by one, the others followed suit. I lay on my back on a bench, closed my eyes, and by breathing long and slowly, with eyes closed, tried to lower my pulse rate and focus on the task at hand—to run faster than ever before.

Dr. Len Zaichkowsky has a strong interest in sport and our discussions with and without the athlete present have been helpful in focusing upon the athlete's problems, goals, and the available methods of stress management. With biofeedback to give quantifiable feedback information, any athlete may learn how he or she can best gain personal control of what most have considered uncontrollable factors.

6

The Role of Hypnosis in Competitive Stress Management

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Overview of Stress

Stress is a condition with which every human being is familiar. Yet the term is so widely used that it is often subject to confusion and ambiguity. For the purposes of this discussion Hans Selye's definition of stress will be used: "Stress is the nonspecific response of the body to any demand."[1]

It is common knowledge that the human body physiologically responds to demands (stressors) whether those demands be pleasant or unpleasant. The demands may be different but they all elicit the same physiological response. What is happening is that when a demand is placed on the body the entire system mobilizes for action. Upon seeing a demand in the environment, whether danger or some other form of the unexpected, the body automatically modifies itself to deal with the new situation. The entire system becomes alive and alert, ready to respond as it deems fit.

The above description of stress is often referred to as the "fight or flight syndrome." Here is an example of the syndrome in the area of athletics. You, as an athlete are informed that you will be playing in the state finals. Your coach calls you at home to notify you that you will be competing tomorrow morning. It does not necessarily matter whether you think that you will win or lose. You will spend a restless night anticipating the contest. You certainly had an initial stress response while talking on the phone (remember the feeling in your throat and/or stomach?) and you will have a similar reaction as you go to the contest the next morning. The expectation of the event can be every bit as powerful a stressor as the actual event itself.

Uncertainty and novelty can be stressors. Anything which happens for the first time, or which one cannot immediately make sense of, is likely to trigger stress. Normally, one quickly analyzes what is happening or decides that it is not dangerous and the stress reaction is stopped. If sense cannot be made of what is happening but some constructive ways of handling the situation can be found, the stress reaction will decrease or stop. However, a completely disrupting stress reaction will occur if the danger is real and serious or if uncertainty and doubt continue for a prolonged period.

What is quite stressful for one person may not be for others. It is not necessarily the intensity of the stressor that determines the intensity of a reaction; it is one's perception of the stressor that determines the intensity of the stressor. So when the state finals come around, an athlete who knows the game inside and out, backward and forward, may not respond in such a panic-stricken way as the athlete who is new to the team. Whatever the reasons, people do respond differently to stress.

The relationship between stress and performance is especially provocative for

athletes and coaches who are always interested in increasing productivity. In general it can be said that the performance of both the coach and the athlete is best when moderate demands (levels of stress) are being made upon them. If the performance is less than optimal then it is likely that the demand is too high or too low. For the typical athlete, the more common problem is to experience so much stress that productivity is adversely affected.

Hypnosis as a Tool for Stress Management

Debate over the use of hypnosis for enhancing performance has been waged for years. Many claims have been made and refuted for the miraculous things that can be achieved using this technique. It is important to emphasize that hypnosis is not a mystical nor a miraculous method of accomplishing fantastic feats. It can, however, be a useful tool for many dimensions of the psychological aspects of the athletic area. Hypnosis is perhaps most useful in the sense that it can be used to speed up what are otherwise quite normal psychological processes. For instance, the process of coping with stress, the topic addressed here, can be facilitated by hypnosis.

Over the years the methods of using hypnosis have been revised and improved. However, there is no real agreement among psychologists and researchers on a theoretical, much less an operational, definition of hypnosis. Most authorities agree that the process of hypnosis is a technique for making the subconscious conscious. Most important is the fact that hypnosis is a natural state; one can frequently slip in and out of hypnotic-like trances throughout the day. The techniques used and called hypnosis are merely a more precise method for controlling and using this ability of communicating between the conscious and subconscious aspects of the individual.

The following comments summarize both the approach and the sequences in which hypnotic information and experiences could be presented to the athletes.[2] Some of the procedural suggestions have come from the athletes themselves. Whenever possible the coach should participate both in the sessions and in defining the goals for the group as well as the individual athletes.

Since the level of understanding of hypnosis varies widely among athletes and ranges from "losing control of their will" to the more sophisticated realization that one practices and performs in a "trance" on many occasions, it is often preferable to eliminate the use of the word hypnosis in referring to the training sessions. The sessions may legitimately be referred to as mental practice sessions or relaxation sessions, etc.

The Harvard Group Scale of Hypnotic Susceptibility[3] is easily administered to the athletes as a group. This test provides information to the hypnotist concerning how susceptible the athletes will be to the suggestions and, perhaps, the difficulty of suggestions with which to begin the training.

The progressive relaxation induction techniques appear to be the most appropriate for use with athletes in a group setting. This technique, if used judiciously, will not produce side effects which are negative to athletic performance and it allows those athletes with a wide range of susceptibility to benefit from the sessions. Throughout the induction and the remainder of the session the athletes are given pleasant images to focus on, particularly images associated with the athletic event in which they participate. They are frequently asked to imagine themselves in that athletic situation.

Following the induction, the athletes could be asked to deliberately bring themselves "up" to the feeling of the best situation for performing. They are just excited enough to perform well but not too excited. They are just relaxed enough but not too relaxed. The hypnotist can guide the athletes through exercises designed for controlling these feelings: taking themselves too "high" and noting how it feels; taking themselves too "low" and noting how that feels; bringing themselves to feeling "just right" and maintaining that feeling. Emphasis should be placed on the fact that they, the individuals, are controlling this feeling and with practice can develop good control regardless of the situation.

Another effective exercise utilizes the men-

tal practice of a selected activity the athlete is to perform in the athletic situation. Prior to each hypnosis session the athletes should individually meet with the coach to establish what physical aspect of their performance each of them could practice during the hypnosis session. For this exercise, the activity that should be chosen would be one they could perform correctly but were having trouble executing optimally when under stress because of the athletic event. For instance, a particular dive an individual might be having trouble executing during a meet would be chosen for practice in the hypnosis session. The athlete is asked to imagine how it feels to correctly do the dive. They are not to "watch" themselves perform the dive but to imagine how their body feels when correctly executing the dive. The hypnotist then guides the individuals through mental imagery exercises of feeling the performance correctly, incorrectly, in slow motion, and at appropriate speeds. Each time the individual is urged to feel the differences between the correct performance and the incorrect performances. "Imagine how it feels!" This exercise is completed after the athlete has mentally practiced the performance correctly and at the correct speed several times.

Focus of attention exercises in the hypnosis sessions have been found to be quite useful.[4] The athletic event in which the individual participates dictates to a degree how this exercise is approached. For instance, a diver is in an advantageous position if attention can be focused on a single point as the dive is approached, thus eliminating distracting external cues. Therefore, suggestions would be given for concentrating upon a chosen point on the board, counting to a specified number, and beginning the dive. An athlete participating in a team sport, such as football, or an individual sport, such as tennis, must, however, attend to multiple external cues to perform optimally; the hypnotic suggestions for concentration must be adjusted accordingly. Regardless, suggestions for concentration can be given appropriately and practice on this aspect of performance can be accomplished in the group hypnosis session.

The last of the group hypnotic sessions could best be used in giving the athletes suggestions for how and when to practice self-hypnosis during the week. This is a relatively simple and quick method of helping the athlete to learn self-hypnosis as well as a method for practicing the exercises given during the group session. As the athlete becomes more secure and skilled at self-hypnosis, suggestions can be given for the use of self-hypnosis prior to and/or during the athletic event. Some individuals become quite proficient at using self-hypnosis for "psyching" themselves up or down before and at various points throughout the athletic situation. Self-hypnosis is also useful for focusing attention during the execution of particular skills, eliminating distracting and irrelevant cues coming from the environment, such as crowd noise or sideline movement, and conducting a rapid mental practice of a specific skill.

When appropriate, suggestions for refocusing fatigue cues can be useful. Often athletes, upon noticing that they are becoming tired, tense in an effort to overcome the results of fatigue. This increased tension causes the more rapid onset of fatigue and its negative effects on performance. Tension is fatiguing. In addition, attention to the fatigue takes attention away from appropriate aspects of the performance. Through hypnosis, it can be suggested to the athlete that when he/she feels the first signs of tiring it will be a cue to slightly relax and to focus attention on some aspect of the performance. Note that it is important *not to suggest* that fatigue go unrecognized, as the symptoms of fatigue are an important warning signal. To remove this warning by means of hypnotic suggestion could put the athlete in danger of injury.

Just as fatigue signals can be refocused so can pain signals be refocused. For example, a diver has a minor sprain of the left ankle. The trainers and doctors establish that diving is not dangerous or injurious to the athlete. However, the twinge of pain felt upon springing distracts from his/her concentration on the dive. Perhaps more important (in terms of performance) is that the anticipation of the twinge could make it difficult for the athlete to approach the dive. Under hypnosis it could be suggested that the twinge of pain would re-

main as long as was natural. However, it would not distract from concentration. Rather, it would serve as a physical cue to focus attention upon the dive to be performed.

As suggested in the previous example, individual hypnotic sessions with athletes who are average to above average in suggestibility can be useful.[5] In addition to dealing with pain, other general areas can be handled in a directive manner that is individual- rather than group-appropriate. For instance one could handle analyzing or overcoming a "block" of a specific performance.

How does all that has been said about hypnosis relate to the earlier statements concerning stress? Hypnosis gives the athlete a specific and direct method of dealing with various aspects of athletics which produce stress. As described, the athletes can practice and gain control of self in the sense of "psyching" before a game or performance. Too often the athlete is merely told to get ready and they seldom have any idea as how to accomplish this task. Should they "psych" up or down and how? Uncertainty is a stressor. Whether the self-hypnosis technique is completely successful or not in achieving appropriate "psych" levels, much of the uncertainty is removed from the situation and thus, stress is reduced. Furthermore, the athlete can be given a method of concentrating attention which in and of itself will produce better performance. The fact that it removes uncertainty and gives the athlete a sense of self-control reduces stress. Suggestions for removal of extraneous external cues that are distracting can be viewed as suggestions for removing external and unnecessary stressors, such as crowd noise.

Another strong support for the use of hypnosis in stress control is the fact that people differ in what is stress-producing. The hypnosis technique allows for these individual differences. Either the athletes make decisions for themselves in the group session, e.g., psyching themselves to their own best level, or the athlete can be dealt with in individual sessions, e.g., control of a specific and distracting pain.

The use of hypnosis in athletic situations, be it as a stress control technique, a motivating technique, a practice technique or any other, has only recently been an acceptable approach. Much is still not known of its actual or potential resourcefulness. Coaches who are interested in hypnosis as a tool can offset the potential cost of a psychologist or sport psychologist by permitting case studies and research to be performed on their athletes in exchange for the application of the known benefits. Most of what is presently known about hypnosis as a performance tool is taken from athletes' subjective reports or from areas outside of athletics. More applied research would be quite informative. The use of hypnosis with the administration of anxiety report forms from the athletes might be a fruitful approach. Various physiological and biofeedback measures should produce some informative data. Perceived exertion studies could potentially be used for gathering stress information and the effect hypnosis has upon it. Both coaches and researchers must accept hypnosis as a viable option and as a valid area for research if it is to become the useful tool that current knowledge suggests it can be to assist the athlete in attaining optimal athletic performance.

FOOTNOTES

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Coach's Reaction to Dr. Veronica L. Eskridge's "The Role of Hypnosis in Competitive Stress Management"

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Stress reaction is an individual phenomenon because no two athletes react to the performance situation in exactly the same way. Therefore, it is not possible for the coach to deal with a team or group of athletes as one unit to prepare for competition. Individualized stress control is essential to enhance the performance of each athlete. Hypnosis appears to be one method which produces positive results by helping athletes to deal more effectively with their own stress reaction.

It is important to analyze the role of the coach in the stress-controlling process prior to determining how stress is to be controlled. The coach is responsible for his/her athletes' physical development (skills, fitness etc.) as well as cognitive development related to the athletic situation. The coach is responsible for performance levels, safety, and individual and team output.

Teaching the skills, plays, and team work are probably the easiest part of a coach's job. The difficulty lies in the psychological aspects of self-confidence, attention, and motivation. Any coach would probably welcome with enthusiasm a technique which promotes appropriate or successful methods of handling these psychological problem areas. Hypnosis appears to be such a technique. There is little doubt in my mind that the training sessions described by Dr. Eskridge would be a valuable asset. There are, however, unanswered questions about which I, as a coach, would be concerned.

First, perhaps, is the logistical question of when should this hypnosis training begin for an athlete? Most serious college-level athletes have learned some form of self-hypnosis, psyching or mentally rehearsing before arriving at that level. The key to effectiveness is what happens then. Does the athlete really do anything beneficial at that point? The training sessions described by Dr. Eskridge may be essential to identify the key elements to which the athlete should attend during the period of self-hypnosis. Certainly beginning performers could benefit from a detailed analysis with attention to key points. When, during an athletes' career, is it most appropriate to begin such training? Without doubt, the earlier this ability is acquired the more beneficial it may become. Is it feasible to begin this training at the high school level, the junior high level, or before?

Another area of concern is the coach's role in using hypnosis. Should the coach learn hypnosis techniques in order to hypnotize athletes? Should the coach allow those young people in his/her care to be "guinea pigs" from which some sport psychologist can gather data? What credentials should an individual possess before a coach permits that individual to "play with the minds" of athletes?

The coach who uses hypnosis must be supportive of the entire procedure, obviously, but few coaches have the training or expertise to

do the job themselves. While it is a relatively easy task to "put someone under" (certainly something all of us could easily master), what possible difficulties or problems could arise? Is there potential harm or are such claims simply the cry of alarmists inhibiting progress? Are we capable of handling such situations without further training? Even the experts do not agree!

What are the legal and ethical ramifications of hypnosis related to athletic preparation? Who is to be held responsible if the unforeseen does happen? Who is going to protect young athletes from the unscrupulous coach whose primary concern is other than the welfare of the athlete?

Perhaps the major disadvantage associated with the training sessions previously discussed is where to find a qualified individual who is willing to expend the necessary hours and effort, who has, or is willing to acquire, the expertise associated with specific athletic events, and who is geographically and temporally available when the training sessions are scheduled.

This area of research is fascinating and potentially of great benefit. There is a distinct need to help athletes learn to use whatever techniques and cues are available to benefit from those psychological aspects of performance which so often elude conscious control. The use of hypnosis is but one of many self-regulation strategies utilized to speed the natural acquisition of these skills. This suggests tremendous benefits for the athlete.

7

Stress Management for Professional and World-Class Competition

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Sport psychology is shifting from the laboratory to the playing fields. There is a need to work with and design programs (both active and practical) that will help athletes of any caliber or sport fulfill more of their potentials. Each athlete is really a team of muscles, coordination, and emotional control. The management of such a team requires psychology as well as physical expertise. Therefore, it is imperative that stress management techniques are available to coaches and other practitioners of sport.

This paper is not a critical review of competitive stress management techniques. Rather, it consists of subjective observations made in the field working with professional and world-class athletes. Research in this area must be done to clarify which cognitive strategies work best with the various categories of athletes and their varied sports.

This paper is not directed specifically at the stress problems that confront professional and world-class athletes. If it were, it would have to include techniques for alcohol rehabilitation, sexual, and marriage counseling, and perhaps a short course in money management. All of these are either symptoms or by-products of a lifestyle that allows for and, to some degree, encourages certain abuses. It might even be concluded by the general public that drugs and alcohol are a stress management technique. The lifestyle of the professional world-class athlete is displayed daily in a fishbowl-type of existence. Fans admire and scrutinize these athletes; thus the athletes must live their lives differently, and perform at the highest levels. It is in their personal lives that outside stress interferes and often carries over into their competitive performance. Add to this pressure a fierce desire to succeed, and these outside frustrations and distractions become even more apparent.

The purpose of this paper is to demonstrate to the sport psychology consultant, coach, and athlete some of the uses of stress management techniques including relaxation training, and imagery, to not only reduce competitive stress but also to promote and encourage optimum performance.

Relaxation Training

My first experience with stress management occurred as an undergraduate. I was writing a term paper on whether relaxation had any major effect on athletic performance. The only information I had on relaxation was a limited psychological description. My research efforts prompted me to apply this newly acquired knowledge to a swimming class I was teaching.

The class consisted of adult nonswimmers. They had been working for five weeks, and now possessed the skills needed to swim across the deep end. A slightly modified version of Jacobson's Progressive Relaxation Technique was applied.[1] They were in the water wearing life jackets. After they went

through the technique, instructions to think and feel pleasant thoughts about the water, while they floated on their backs at the ten-foot level, were given. They then imagined themselves to be comfortably swimming across the pool. Following the exercise, they actually swam across the pool. Much of their anxiety had passed, and most made it across with very little assistance.

In the succeeding years, I have realized that a well-defined relaxation training program can be an excellent skill for any athlete to acquire. Relaxing has many implications. First, it allows an athlete to shed tension and stress caused by everyday life and competition. Secondly, relaxation is necessary for conservation of energy, enabling greater endurance. Lastly, and possibly most important, relaxation training leads to greater awareness of the entire body.

Relaxation eventually becomes a performance skill, just as learning proper technique in the pole vault is a skill for the decathalon. It is also a personal skill because each athlete will use a different combination of relaxation techniques. Some of these include progressive relaxation, yoga, biofeedback, autogenic training, hypnosis, meditation, and sensory isolation tanks.

Imagery Training

The bulk of my experience has been in the area of applied imagery training. There are many diverse skills an athlete can develop with the aid of imagery. While working with athletes, I have followed these basic guidelines:

- define realistic goals and limitations which are sport specific;
- utilize relaxation training to prepare for imagery;
- develop a very clear image or feeling of the successful performance;
- maintain periodic surveillance over the athlete's experience.

Clear pictures and feelings are important to the process. It appears that the clearer the picture, the better the effect. The picture can be of the event or of the athlete; it can and should be from many perspectives. This not only helps the athlete become more aware of the situation, but also aids in reducing anxiety as well. A pole vaulter may visualize what the performance looks like from the pit or from atop the crossbar. The resulting familiarity with the feel and sight of a successful performance will lessen anxiety as he/she vaults a new height.

Monitoring has always been important in order to subjectively judge how an athlete is doing with the visualization. This can be accomplished by asking the athlete to respond with a predetermined cue. Communication allows the athletes to take their time and feel comfortable with the clinician. It also allows the clinician to monitor the athlete's attention span and determine whether or not the subject has drifted into sleep. This can be a problem when working with an athlete who works out four to six hours per day.

The most familiar way of using imagery is to have the athlete see his/her competition. If we can simulate actual competition in the athlete's mind, competitive stress may be lessened by getting him/her to that stress. This procedure can be accomplished by slowly building up pressure to fit the situation.

There are times when stress can be managed by having the athlete go through the event and see that he/she can, indeed, perform within his/her goals and limitations. A young swimmer came to me two days before his league championship. He'd had an accident and had almost severed the middle finger of his right hand. Due to the apprehension because of pain, he had developed a great deal of anxiety about not being able to swim. He was also very concerned about disappointing his relay team. After using imagery and relaxation training for the two days preceding the event and seeing a very strong image of himself swimming well (in a surgical glove) and feeling that his teammates appreciated his efforts, this event happened. He swam well enough to surpass his own personal record swim without too much discomfort.

The practice of imagery training combined with relaxation can improve performance. A world-class decathlete came to my office in the hopes of learning how to improve his performance. We used imagery training for all

the decathalon events, but primarily focused on the discus, shot put, high hurdles, and high jump. This coincided with the emphasis of his physical training during the fall and winter months. Within one week after his first session, his performance started to improve. Within six weeks, he had broken his personal records in five events, and had approached the others closely, something he had not done for almost two years.

Table 1. Treatment effects of decathlete's performance.

Event	*Career Best Pre-Treatment*	*Treatment Period Oct.-Dec. 1979*	*Post-Treatment Jan.-Aug. 1980*
Discus	139′	177′0″	155′
400 Meters	48.72*	48.9 sec	49.1 sec
Shotput	39′	46′	42′
100 meters	10.88	10.63 sec	10.96 sec
High Jump	6′2″	6′6″	6′2″
1500 Meters	4:18*	4:20	4:35
Pole Vault	15′9″*	15′10″	15′
Long Jump	21′3″	23′6″	21′5″
110 High Hurdle	14.7*	14.9 sec	15.2
Javelin	239″ 1978 (1979-80 201′ best)	217′	Less than 200′ (injury)

*1978

The decathlete worked on imagery training a minimum of three and one-half hours a week in my office, and one hour per day, five days per week at home. During this time period, he won three decathalons and scored better than he had in two previous seasons. He continued the imagery training for two months, and then stopped because of growing demands on his time. A month after ceasing the cognitive strategies, his performance slid back. In some events, he performed below his pretraining level. Little injuries began to occur, further hampering his performance and forcing him to withdraw from two decathalons. This was something that had only occurred twice before in his entire career. Table 1 charts the treatment effects on his performance.

Imagery training can also be used for the development of timing and pace. In the case of figure skating and gymnastics, this can be accomplished through music. The program music can be played while the athlete is in a deeply relaxed state while developing the feeling, the timing, and the precision. A metronome can be used by track athletes to aid in training and the development of pace. Both pace and timing are very much like an internal clock. Imagery training can be used to fine tune them.

Another advantage of imagery training is that because time is relative, an athlete can look at performance at different speeds. It can be an advantage to go through a performance in either slow or fast motion. With slow motion, the athlete has the opportunity to further look into and analyze performance. Fast motion can be used to run through a particularly long event such as a marathon or decathalon and still give the athlete a feeling of continuity which may reduce anxiety.

For imagery training to have the greatest effect, it must be flexible. In many training situations, the creative coach or sport psychologist can come up with an imagery strategy that may indeed help the athlete reach his or her own potentials.

Athletes can be taught as individuals or in a group. If a group situation is involved, it is important that individual programs are worked out so that each athlete has his own program. Cassette recorders work well for this purpose, allowing group work to be even more effective.

The strategies covered were those applied in the field and in individual situations. Further study is necessary to substantiate the role of complex imagery training with different skills and skill levels. The only way this can be done is by looking at the whole picture of athletic competition along with closed skills and seeing the effects of mental training on the athlete. It is evident that we can no longer separate mental training from physical training. The challenge of sport psychology is to bring practical stress management techniques to the field.

FOOTNOTE

[1]Jacobson, E. *Progression Relaxation*. Chicago: University of Chicago Press, 1938.

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Coach's Reaction to Michael D. Margolies' "Stress Management for Professional and World-Class Competition"

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As a practicing coach, semiprofessional competitive Masters athlete, and researcher in human performance, I view the title "Stress Management for Professional and World-Class Competition" as pertaining to how stress manifests itself during the season as a result of training; how stress manifests itself prior to competition; how the athlete can handle the problem in both cases.

The term stress has been defined by Dr. Han Selye as the rate of wear and tear in the human body that accompanies any vital activity. It is our body's mental, physical, and biochemical responses to conditions that scare, threaten, anger, bewilder, or excite us. If prolonged, fatigue or damage to a system of the body will ultimately cause mental or physical failure.

The word stress is a general term that is really composed of four parts: *eustress*—happiness and elation; *hypostress*—boredom and lack of stimulation; *distress*—anxiety, frustration, and anger; *hyperstress*—overstress and/or systemic failure. The latter two are most critical to the competitive athlete.

Hyperstress results from prolonged near-maximum training efforts with the athlete attempting to maintain peak physical training. Very few athletes can physically or mentally cope with this longer than six to eight weeks. Frequent competition and consistently intense workouts deplete the athlete's strength and endurance. As the athlete fails to keep up with the heavy workloads because of fatigue, deconditioning sets in and performance declines. In the past this has been referred to as staleness or a slump.

Using Selye's model of reactions to stress one could say that the three stages of stress through which an athlete passes are: *alarm reaction*—pre-season training; *resistance stage*—being in good condition; *exhaustion stage*—a drop-off in performance. To achieve the resistance stage, the athlete trains for six to eight weeks. Overtraining is a definite problem in amateur as well as professional athletes. The result is frequent injury or listlessness, run-down feelings, and definite signs of hyperstress. To combat this syndrome, most of the year should be devoted to basic training with the emphasis on systematically increasing work loads. Peaking should begin about one month before a critical meet or game.

The technique of overload training during the week provides the necessary effect of physical stress on an athlete to raise the physical tolerance level that is so important for competitive efforts. This is physical stress. It is absolutely necessary, but it can be carried too far.

It is the responsibility of the coach to detect the signs of overstress in the athlete. Typical symptoms are prolonged fatigue, muscular soreness, weight loss, muscle cramps, inability to maintain practice session intensities, loss of kinesthesis, mental attitude change, depression, amennorhea in women, a significant drop-off in athlete performance, and a

decline in scholastic achievement. Generally, these problems can be handled physiologically by adjusting the training schedules of specific athletes. Vary the training schedule, add variety to the workout, use hard days and easy days, and provide a day off now and then if needed.

Most athletes do not know how to pace and peak themselves for competition. The general attitude is to strive to exceed one's maximal capacity every game or meet, to conquer the opponent, to win and never lose. The greatest impediment to achieving one's maximal capacity is taking a sport so seriously that the fun of it is destroyed. Ultimately, one's performance diminishes. The constant state of worrying about beating the opponent produces severe pregame anxiety, and it definitely detracts from the intimate concentration or single-mindedness that permits an athlete to attain better times. This thought process only reduces the prospects of winning.

If the goal is to perform at maximum levels, then the greatest concern should not be whether one wins or loses. It should be, "Will I do my personal best? Will I maintain perfect form? Will I conquer me, my lesser self?" The athlete should always keep within reach of specific personal goals that are realistic and attainable. World-Class athletes most generally train with the knowledge of what they are doing at all times. They are so tuned into their bodies that they are kinesthetically aware of their training intensity levels, and they establish specific attainable goals to accomplish each week. By the time a meet arrives, the athlete enters it with the calm assurance that he will better his previous best effort. Winning, therefore, is much broader than just defeating someone else. It's conquering oneself that is more important. There is just as much satisfaction in self-improvement as there is in winning.

Coping with pre-event and event mental stress begins during regular practice sessions and even before that. Developing a good training base provides athletes with the assurance that they can physically endure. However, the technical skills needed to properly perform are learned in multiple ways. Once learned, an athlete will have complete confidence in his/her capabilities. Stress will then be lowered but not eliminated. Learning proper skill performance comes from: intently listening to a coach talk them through the movements; reading; attending workshops and clinics; observing professional and premier amateur athletes perform; talking to superior athletes; watching films, television, and critiquing videotapes of themselves performing. After these sources of information have been used, imagery becomes a highly important tool for engraining proper technique into the nervous system.

Springboard divers may think a specific dive through for a year or more before they physically attempt it. They will think it, dream it, feel it, talk it through, watch and talk to other divers. They will see themselves going through the dive in slow motion; they will speed it up; they will think of the feeling that should occur in selected parts of the dive, and then put it all together in their minds. We refer to this as the part-whole method of learning. The key is conditioning nervous pathways through imagery first until the kinesthetic feelings are developed; then the actual physical attempt is made.

Even though all of these techniques are practiced, refined, and tuned to perfection, pre-event stress must still be controlled in all athletes. It is a necessary ingredient to performing well, but an athlete can perform well or poorly according to how pre-event stress is handled. Anxiety is easily recognized. The athlete will feel a warmth rush over the body, the heart rate speed up, the hands become damp, the mouth become dry; sitting still is impossible, self-doubt creeps in, "butterflies" in the stomach occur, the urinary and intestinal tracts work overtime, an insatiable desire to sleep frequently sets in, and a feeling of muscular weakness is overbearing. When these occur, development of a positive mental attitude is of paramount importance. The athlete should try reading a book or magazine or stay in a relatively quiet place and avoid the surrounding stimuli created by the presence of other competitors or audience. The athlete should daydream, go into a self-imposed trancelike state, close out all sounds, slowly with the use of imagery. As a practicing

athlete, my pre-event stress reduction is handled by meticulously concentrating on the specific finite mechanics involved in the competitive sprint breaststroke angles of the hands, pressure in the shoulders, or the hands and in the knees, timing the breathing, body position in the pull, kick and glide, turns, and grab-start. In addition, I establish an internal metronome cadence that permits a rhythmic, consistent body movement that continues throughout a race regardless of the discomfort level. In combination with this is a routine of flexibility, relaxation, and rest. Think of the investment of time and discomfort that have been made preparing for this event. Don't waste the hours spent in training in fruitless pre-event anxiety.

The athlete should practice dynamic or progressive relaxation, but remember to only lower the tension to a level that permits him/her to retain an optimal level of tension for the performance. No one competes well after being immediately awakened from a sound sleep. The object is to turn on the tension a little bit immediately prior to the start of the event without wasting lots of nervous energy long before the event, otherwise the athlete becomes too tired, concentration on skill techniques is lost, the athlete will over-excel, and performance is adversely affected.

During the actual performance of the event, an athlete can still let mental stress affect his/her performance. All too often the athlete gets caught up in the performance of the opponent. The athlete must play his/her own game, run or swim his/her own race. The athlete must play the game within his/her skill and physical capabilities regardless of what the competitor is doing. The athlete must think "It's not a life or death situation. I'll try my best, and if I don't succeed, so what? I've prepared myself well up to this point. If I lose, it's because the other person has prepared a little better. I'm the best that I can be to date. I'll give it my best effort and maintain perfect form and beat my own time. I'll evaluate my performance later." This is the proper healthy attitude. When physical distress sets in during a race, the athlete can still call upon imagery to block out the tendency to succumb to the discomfort. Instead, extreme concentration on technique should be rigidly enforced regardless of how much discomfort is felt. Many times the athlete who wins is the one who has trained well and maintains proper technique throughout an entire event.

In summary, Mr. Margolies is correct in that relaxation and imagery are integral parts of competitive athletics, but both athletes and coaches must be made aware of what stress is, how it can be controlled, modified, and manipulated to the advantage of the athlete. Recognition of the overt as well as the subtle signs of physical and mental stress is necessary in order that appropriate coping techniques can be applied at the correct time to promote the best possible personal performance.

8

Coaching Strategies Based upon Tension Research

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Dr. William Hughes of Temple University once related to a graduate class that the forgotten individual in any profession is the "middleman." This is the person who attempts to bind the data of the laboratory with the wisdom of experience. The glue or welding material is often insufficient for the task but the middleman plods ahead looking for compatible surfaces on both sides which will result in a better understanding of diverse views and the development of new insights.

In another context, Arthur Koestler has portrayed the oscillating, uncertain path of the middleman in terms of the intersection of two planes (see Figure 1).[1] The planes (M_1 and M_2) represent two frames of reference. The solid line shows the path of the "middleman" who occasionally hits upon the intersection, the latter represented by black dots. In the present discussion, the two frames of reference represent the researcher and the general practitioner or coach.

The field of tension control has a rich assortment of researchers and practitioners. Among the latter, athletic coaches have occasionally taken the "middleman's" path.[2] As the Koestler model suggests, both the researcher and the coach play a role in providing insights for the "middleman."

The coach is typically impatient in a number of respects. Hearing about one technique or another, there is always the urge to try this or that in hopes that it will help to resolve some pressing problem. At times, suggestions are simply rejected without trial but the most common test of a suggestion is "if it works, use it!" The typical coach becomes a virtual authority on "things that seem to work" and is very much like a psychiatrist in general practice in this respect. Sometimes the things "that work" seem to go against the generalizations from research.

In one respect, the coach and researcher are similar. They have few opportunities to speak with one another. This is perhaps the motivation behind AAHPERD's series *What Research Tells the Coach About . . .* It is probably true that the coach would also represent a good resource person for the researcher but their paths seldom cross with few opportunities for a meaningful dialogue in both directions.

Although the researcher may have precious little to share with the coach, when the data suggests a very strong relationship over time, the coach should take note. From time to time, clinical significance is cited in addition to the traditional use of statistical inference. For example, Budzynski and others showed rather conclusively that home practice was an important ingredient in the reduction of tension headaches.[3] In the same series of studies, it was pointed out that the practicing clinician is often a rich source of information about "things that work." When given appropriate forums for interaction, the coach has a great deal to share with the researcher.

Other contrasts could be pointed out. The

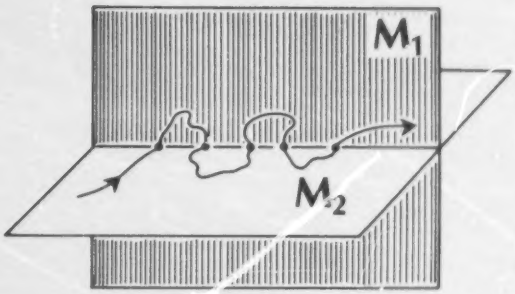

Figure 1. The "middleman's" search for concepts at the intersection of two frames of reference. (Adapted from Kiestler, 1967)

researcher is often persuaded by some established theoretical perspective to develop and test hypotheses. The clinician or coach is often found to be a highly specialized technician with little interest in theory. In reviewing the gymnastic literature, for example, one finds little theoretical work in English.[4] We will shortly examine one aspect of gymnastic theory which should prove to be enlightening.

Gymnastic Theory and Tension Control

A representation of the universe of gymnastic elements is found in Figure 2. The diagram identifies the placement of tension control in gymnastic work as a function of balance. Pinpointing the role of relaxation and tension resulted from the question, "what is pure balance?"[5] The shaded portions of the semicircle (R_1 and R_2) representing balance elements are in concert with Jacobson's dual notion of tension control which is inclusive of general or complete relaxation for purposes of health and rest and differential relaxation for movement efficiency.[6] It is not coincidental that this representation also reflects Cannon's notion of "equilibria" for which he coined the term "homeostasis." Of interest here is Cannon's statement suggesting that ". . . every complex organization must have more or less effective self-righting adjustments in order to prevent a check on its functions or a rapid disintegration

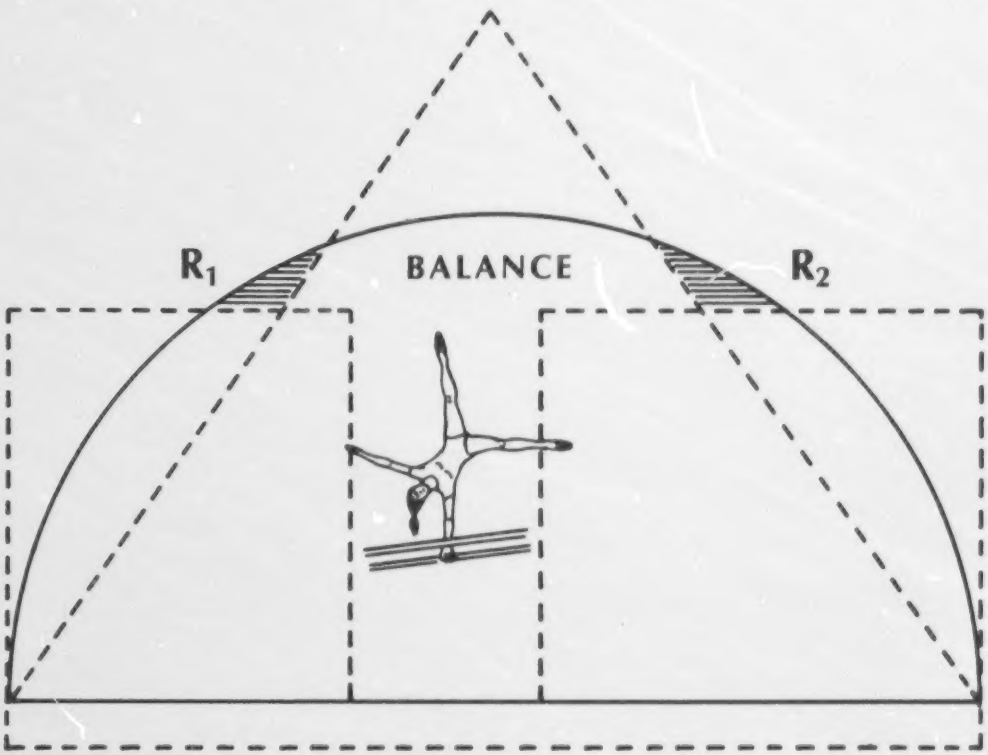

Figure 2. The identification of general and differential relaxation within gymnastic balance.

of its parts when it is subjected to stress."[7]

The acquisition of skilled relaxation, both general and differential, is of prime interest in the development of suggestions and adaptations for athletics. Both varieties are performance-oriented. General or primary relaxation is represented in Figure 2 as R_1. Differential relaxation is represented by R_2.

The notion of differential relaxation is compatible with theoretical positions on activation. Just as activation is defined in terms of the release of energy into various internal physiological systems, moving in a differentially relaxed manner implies the efficient use of the body's energy.[8] Inefficient efforts have been defined as "dysponetic" responses by Whatmore and Kohli.[9] These authors also suggest four effort categories that are useful divisions for the suggestions offered the coach: *performing efforts* (learned motor skills); *bracing efforts* ("on guard" or fight-flight efforts); *representational efforts* (visualization and speech); *attentional efforts* (focusing upon sensation or "going as if to . . ." efforts).

Although the example cited above is from the domain of gymnastics and some of the suggestions for coaching have a gymnastic reference, experienced specialists in other sport disciplines should be able to transpose the ideas encountered here.

Applications of Progressive Relaxation

Progressive relaxation (PR), like any other skilled behavior, requires time and practice. Few clinicians question the efficacy of PR in treatment but the restraints of time make its widespread use difficult. Studies comparing treatment effects typically refer to abbreviated PR or other sorts of brief treatment.[10] Many psychiatrists and clinical psychologists favor electromyographic (EMG) feedback or combinations of biofeedback and brief relaxation instruction. Since the educator can find the necessary time, PR is ideally suited for educational purposes. Such purposes would ordinarily include athletics.

Two fundamental lessons are suggested in the Jacobsonian literature.[11] His measurements of muscular tension were painstakingly precise. Any history of EMG instrumentation must necessarily include his many contributions.[12,13,14,15]

The second lesson is one of patience in therapy. There is simply no quick method to teach a person to relax. When a patient visits the physician with any one of a number of tension-related symptoms but with no apparent organic involvement, the therapy of choice is tranquilization. The doctor either doesn't know how to teach such patients to relax or, if he does know, cannot find the time. Jacobson has been one of those rare physicians who took the time to teach. Thanks to his efforts in self-observation beginning in the first decade of this century and his technical instruction based upon years of clinical practice, we can adapt his techniques for use in education and athletics.

S_1: Learn Progressive Relaxation Yourself[16]

There is abundant evidence for such a suggestion. Why progressive relaxation? Because you should learn the best method available.[17] The problem with the use of PR in athletics is again a temporal one. Finding time to teach an athlete proper techniques may be difficult for the coach however valuable the result of such training. This dilemma is overcome when the coach can recommend a local course in tension control. Such courses have been appearing with increasing frequency on college campuses.

Time constraints have led to the use of abbreviated PR in some instances (Wolpian methods) or combinations and selected components of cognitive strategies of relaxation training.[18] Another difficulty with PR procedures, according to Sime, is the length of gestation period, that is, a student must practice quite a long time before the benefits are born out in successful performance. As such there is a real need for a bona fide "free sample" in order to motivate participants to invest the necessary time at practice. Since other methods purported to produce relaxation require trainees to engage in some "cognitive" procedure, e.g., uttering a covert sound as in transcendental meditation or employing phrases suggesting "heaviness" and

"warmth," Sime indicated that some active "scanning" procedure employed with PR might be useful.[19] Having trainees witness a skilled relaxer as a model might be the best "free sample" of all. It has been the experience of the author that even untrained individuals can quickly observe gross differences between skilled and nonskilled relaxers.

S_2: Design and Teach a Course in Tension Control or Take a Leadership Role in the Development of Such Courses

Teaching PR has some positive advantages beyond the development of cultivated relaxation. Teachers very often develop excellent observational skills while teaching tension control classes. The coach who cultivates such skills will be better prepared to observe tension signals before, during, and after athletic performance. Even very minor "bracing" efforts may interfere with performance.

S_3: A Coach Skilled in Tension Control Techniques Often Has Better Control of His Own Behavior During Contests

Coaching behavior and personality style are quite different. In recent years, we are reminded of the contrast between Herb Brooks who coached a very emotional series of hockey matches at the Winter Olympics and "Woody" Hayes, the former football coach at Ohio State University. The former was in obvious control while the latter became so tension-burdened at one point that he struck out at one of the players. The behavior of the coach has an impact potential on the athlete. Where such behavior is obviously uncontrolled, it may affect athletic performance.

S_4: Encourage Instruction in Tension Control in the Elementary School

The widespread use of relaxation training in the elementary school is not presently a prominent feature of the curriculum. Colville provides an excellent rationale for its adoption, however, and there has been more interest in such programs in the last few years.[20] At least one professional athlete has strongly recommended such programs.[21] At the present time we have no longitudinal data on the effect of early training in tension control on the health and understanding of adult populations inclusive of athletes.

Wolpian Adaptations of Progressive Relaxation

Joseph Wolpe's systematic desensitization uses an abbreviated version of progressive relaxation (PR) combined with a hierarchical progression to gradually condition patients to be tolerant of a variety of phobias, e.g., fear of snakes, spiders, heights, etc.[22,23] Wolpe's work is familiar to all behavior therapists. In the development of his abbreviated PR, Wolpe cited Jacobson's conclusion that emotional behavior is absent in the fully relaxed state. The recognition of rather significant bracing efforts in the presence of fear-producing stimuli rather than relaxation per se is the goal of Wolpian PR. Instruction in brief relaxation techniques require recognition thresholds that are not as demanding as would be the case in standard PR. Brief training procedures are therefore easier to teach, require a less sophisticated sensitivity, and take less time. Progressive relaxation is very rarely employed in therapy outcome research but even abbreviated PR often shows favorable or significant effects when compared with other methods. Borkovec and others list more than a dozen comparative studies in this area most of which tested the effects of brief PR training against a variety of other therapies.[24] Gordon Paul's comparative studies are the most frequently cited.[25] Not surprisingly, instruction in PR is often confused with abbreviated methods. Since educators will ordinarily have more time than the busy therapist to teach, it is possible for them to teach the more sensitive version of PR.[26]

Wolpian techniques also include the development of desensitization hierarchies. Performance at each step of the hierarchy is closely observed as patients are gradually "shaped" to relax dysponetic efforts in the presence of a fear-producing stimulus. This procedure is not unlike a gymnastic learning

progression which exposes the gymnast to a series of movement experiences gradually increasing in difficulty. This procedure helps to control the "fear factor." Overt tension exhibited by the athlete at any level of the progression serves as a warning to the coach.

S_5: The Coach Should Be Vigilant for State-induced Tension Responses in the Athlete

A specific example from gymnastics is the performance of the first, unassisted giant swing (see Figure 3). This movement has been selected because it will always be accompanied by dysponetic efforts. If the first trial is more or less successful, many minor tension responses will disappear in Trial 2. But if unproductive responses like overgripping, clenched teeth, excessive verbal behavior, and general nervousness persist, Wolpian-like methods can be applied.

S_6: Make Sure That the Athlete Has Not Advanced Too Rapidly in the Learning Progression—Go Back a Step

Experienced gymnastic coaches can often feel a tension response through their hands since they have had years of "hands-on" experience in the physical manipulation of their gymnasts (spotting).

S_7: Have the Performer Engage in a Strong Contraction of Those Muscles Involved in the Dysponetic Response—After a Few Seconds, Signal the Athlete to Release the Tension

This procedure might help the athlete to become aware of certain tension signals that interfere with performance. Frederick has photographed a number of facial responses

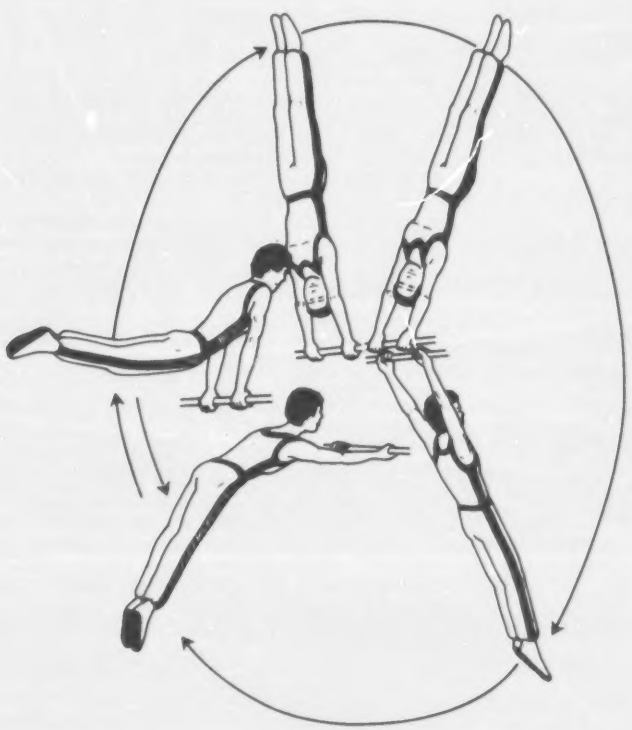

Figure 3. The forward giant swing.

which can interfere with the performance of gymnastic movements the learner perceives as dangerous.[27] It should not be assumed that untrained individuals can either contract or relax specific muscle groups.

Differential Relaxation and Selective Tension

Differential relaxation has been defined in terms of movement efficiency, i.e., using only those muscles that are necessary in performance. Selective tension in the sense used here is a technique designed to bring specific contractile sensations to the attention of the performer. Thus the discovery method is utilized by including sensation awareness in the first lessons of progressive relaxation without specific suggestions about the locus of contraction.

S_R: Pinpoint the Locus of the Desired Tension Signal and Assist the Athlete in Cultivating It (Proprioception)[28]

There are many applications of this suggestion. For example, some gymnasts are unable to contract the gluteal muscles on command particularly in the handstand position. They must be shown just how to make these muscles contract and once learned, they practice tensing them in a variety of positions and finally contract them in the handstand. This very positive use of tension is often overlooked.

One further example from gymnastics is worthy of mention. A "dislocate" on the rings (see Figure 4) is ordinarily taught from an inverted hang. While hanging in this position, the total length of the arms are stretched due to gravity. The triceps muscle, an elbow extensor, is often seen to be flaccid showing no definition. The coach is puzzled by the continuous arm bending behavior of the gymnast during the execution of the "dislocate" and admonishes the gymnast repeatedly to "keep your arms straight!" Progress is often very rapid when the gymnast can feel the contraction of the tricep muscle in hang and is encouraged to retain the sensation throughout the movement. Doherty has described a similar intervention as "underloading."[29]

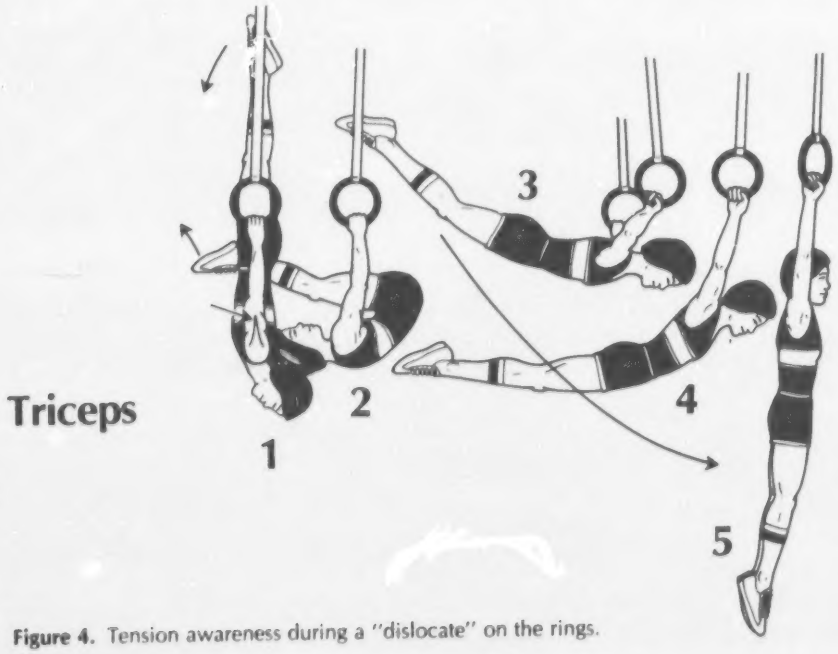

Figure 4. Tension awareness during a "dislocate" on the rings.

S_9: Don't Assume That an Athlete Can Relax or Contract a Muscle Group Voluntarily on Command—Very Specific Instruction Is Required in Some Instances[30]

Redirecting Attention

A large number of intervention strategies, including many therapies reported to produce the relaxed state, are in reality methods of diverting attention from one sort of stimulus to another. For example, Benson's "relaxation response" has no reference to muscles whatever, nor has Benson tested his subjects electromyographically.[31] His method redirects one's attention by the use of inner speech (the word "one" is used) at those times when thoughts seem to be forming that interfere with rest. All meditation procedures include a meditation object. Mental activity in sighted individuals typically includes visualization and inner speech. All such activities have muscular components.[32,33,34] With this in mind, the following paragraphs are devoted to attentional strategies that are frequently, but incorrectly, described as relaxation techniques.

Visualization

Visualization in sighted individuals tends to produce eye movements. Such activity can be particularly distressing during those periods when athletes are waiting to compete. During such periods and given the presence of inordinate mental activity, the eyes may be controlled by diverting their activity in some way. Meditators often use a lighted candle for such purposes. Hypnotic induction sessions are also very frequently eye-oriented with eye fixation being one of the first goals. Chaves' series of tapes on basic hypnotic induction routines are suggestive of some strategies that might be employed in athletics.[35]

S_{10}: The Coach Should Be Aware of Excessive Eye Movements in Athletes and Question Suspected Individuals about Potential Problems

Bringing the eye muscles under control by methods taught in progressive relaxation

Courtesy of A. B. Frederick

Courtesy of A. B. Frederick

would be ideal but it is well known to PR clinicians that relaxation of the eyes is often very difficult for the trainee.

S_{11}: The Coach Might Instruct the Athlete to Close the Eyes and Create a Mild Contraction by Directing the Eyes Slightly Upward

Inner Speech

A second important component of much mental activity that can interfere with performance is a tendency toward inner speech. Compulsive verbalizers are seen making excessive lip movements but actually use all muscles that contribute to speech, e.g., tongue and jaw muscles.

Meditation using a word or sound in inner speech will inhibit the formation of other words and thereby redirect mental activity. Benson's "relaxation response," essentially a spin-off of transcendental meditation, might actually provide some quiescence of the mind for some athletes.

S_{12}: Athletes Distressed by Inner Speech Might Obtain Some Degree of Relief Using Benson's Strategy of Redirecting Inner Speech

Again, it should be noted that an individual who is thoroughly trained in progressive relaxation will have learned to skillfully relax the speech musculature at those times when dysponetic efforts are self-observed.

Other Considerations

Sleep onset problems are described as a function of the speech and eye musculature.[36,37,38]

S_{13}: Athletes with Problems of Sleep Onset May Respond to Training Which Features Relaxation of the Eye and Speech Musculature

The author has found a gymnast who, although skilled in movements in tumbling, none-the-less exhibits dysponetic behavior prior to execution, e.g., excessive speech or inner speech inferred from lip movements and erratic eye movements. Attention in such performers can be directed by cueing initiation to a sound, e.g., a click, given by the coach. The sound is presented when the coach observes general quiescence in the performer. Very often, performances following the sound are executed without errors.

S_{14}: Sound Cued Performance Can Inhibit the Negative Effect of Dysponesis

It should be noted that any cueing of performance that is not directly controlled by the performer is subject to the development of a dependency relationship. When overused, performance may become dependent on the given sound for example. Every gymnastic coach has seen such a dependency relationship develop with certain gymnasts whose performance depends upon manual assistance by the coach ("spotting"). Experienced spotters skillfully withdraw their assistance by offering gradually less manual pressure until the gymnast is weaned from the spot. An identical type of problem is noted in biofeedback research when subjects are weaned from the electronic apparatus which supplies them with signals about events in the internal environment, e.g. muscular tension (EMG), eye movements (EOG), etc.

A much more positive use of sound has been suggested by Cooper and Glassow.[39] An appendix in their book describes the rhythm of selected athletic skill elements. The rhythmic perception of performance elements is thought to reinforce motor skills. Sounds of various types can be matched with the force-time-space ingredients of actual movements. Along these lines, Moreno devised an ingenious apparatus to create the rhythmic elements of a glide kip on the parallel bars.[40] Sounds for a similar movement have also been suggested by Wiemann[41] and Frederick.[42] The effect of such rhythmic constructions on, for example, performance anxiety, is unknown. It would seem that rhythmic modeling is at least as effective (or perhaps more so) as complicated verbal instructions. Rhythmic sounds

may be shaped into performance analogues, whereas verbal instructions about a movement are signals of second order, one step removed from the performance.[43]

Breathing techniques and autogenic training have also been associated with relaxation. In a recent talk to coaches attending the 1980 United States Gymnastic Federation's Congress, Thomas Tutko explained that breathing techniques leading to the relaxed state were invented by Jacobson. Wilson and O'Leary state that "learning to regulate one's breathing is an important element in progressive relaxation."[44] Neither of these statements is accurate. Jacobson has stated again and again that "controlled breathing" is not used as an aid to relaxation in the present method. Rather, the aim is to free the respiration from voluntary influence, leaving its regulation to the autonomic system.[45,46] Autogenic training (AT) also has the goal of "natural" respiration but employs the verbal formula, "breathing calm and regular—it breathes me."[47] Jacobson has suggested that a gross assessment of the relaxed state might be made by observing the breathing rate (personal communication). Persons at rest breathing regularly at a rate of from nine to twelve breaths per minute may be judged to be generally relaxed.

S_{15}: Observe the Athlete's Breathing Rate While at Rest for a Rough Measure of Relaxation

Controlled breathing as it is practiced in Yoga, for example, has more to do with redirecting the attention than any unique physiological benefit that may be derived from it.[48,49] In Yoga, the goal is often alert concentration. Breathing in the prescribed manner has a tendency to interfere with sleep. Transcendental meditators evidently obtain no physiological advantage as a result of practice.[50,51] As pointed out by Curtis and Wessberg, the perception of the experience or the "belief" about the method introduces some "cognitive" variable which seems to transcend the physiology of the experience.

In general, techniques featuring the redirection of attention or the substitution of a contrived response for a less desirable one are little more than convenient "band aids" for the psychologically distressed athlete. Severe cases can be handled individually by the psychiatrist or the clinical psychologist who may elect a variety of interventions. Most coaches will neither have the time nor the experience to handle such cases, however.

The redirection of attention does not result in cultivated relaxation in the Jacobsonian sense but some of the techniques and strategies cited in this section can have temporary, beneficial effects and might be pursued by the coach. The placebo effect or "faith" factor should not be overlooked in the application of such strategies. The cognitive behavior therapists of today hypothesize that behavioral changes may be mediated by self-statements or beliefs.[52]

Davidson and Schwartz suggest that the relaxation strategy employed should depend primarily on anxiety behavior which they classify into two main components, cognitive anxiety and somatic anxiety, each of which might be rated either "high" or "low."[53] In Table 1, the four cells contain suggested therapies for each of four hypothesized conditions.

Too much thought about a performance typically interferes with it. Beginners may have poor form due to a failure to relax differentially. Anderson found that the movement efficiency of skilled players results in a decrease in muscular activity measured electromyographically.[54] Skilled performers may

Table 1. Cognitive and somatic components of anxiety and associated activity or inactivity hypothesized to reduce such anxiety.

		SOMATIC ANXIETY	
		Low	*High*
COGNITIVE ANXIETY	*Low*	Zen meditation Transcendental meditation	Progressive relaxation Hatha Yoga Walking
	High	Reading Watching television Playing chess	Dancing Active sports (e.g. sports, tennis, football, gymnastics)

"choke" when they begin to think about the movements that they ordinarily initiate and combine harmoniously with little conscious attention to detail. The following suggestions are therefore nothing new to the coach.

S_{16}: Too Much Thought about Performance Inhibits Performance

S_{17}: The Best Hedge against Tension in Athletics Is the Administration of Good Pre-contest Practice Sessions

Cognitive Strategies

Therapies, like any other sort of professional activity, are guided by the "spirit of the times." Although it would be simplistic to believe that tension and stress have either a somatic or psychological origin in human beings, the approach to intervention has shifted emphasis over the years. Until recently, behavior therapy has had a definite, mechanistic flavor drawing upon the theory and practice of behaviorism. The self-conscious mind, although acknowledged, has been treated as an unmeasurable, intervening variable.

During the 70s, a cognitive strain of behavior therapy had a renaissance. Prominent members of this relatively new branch of therapeutic intervention commonly invoke the wisdom of the ancient stoic Epictetus who is quoted as having said that "man is not disturbed by things but the view he takes of them."

Although some of the many emergent cognitive-oriented therapies are verbally based, e.g., rational-emotive therapy,[55] it is probably more useful to view cognition within the total context of behavioral change. One prominent spokesman for such a unified view of behavior is Albert Bandura of Stanford University. He believes that learning through paired experiences (conditioning) does not occur in humans automatically but is cognitively mediated.[56]

Relaxation procedures employed in cognitive behavior therapy generally follow the Wolpian tradition. Jacobson's techniques are seldom cited despite his work on the physiological elaboration of mental activities a half century ago. Having lived through the rise and decline of behaviorism but often referring to it as a "half science," Jacobson has been frequently and incorrectly identified with a "motor theory of learning."[57] More recently, Bandura refers to behaviorism as a "truncated image of man."[58] He also warned cognitive behavior therapists not to become so immersed in thought that they are divorced from conduct.[59]

S_{18}: The Coach Should Be Prepared to Observe and Understand the Psychophysical Nature of Athletes

To formulate a few suggestions for the coach, the problem of gymnastic anxiety, "gymnophobia," will be explored. Specifically, the initiation of a first, unassisted giant swing (see Figure 3) has been selected as an analogue for other stress-related experiences in athletics. The giant swing problem (GS) will be examined in the context of Bandura's concepts of efficiency and outcome expectancies.[60] Bandura suggests four primary sources of efficacy information: performance accomplishments; vicarious experience; verbal persuasion; emotional arousal. "Cognitive events are induced and altered most by experience and mastery arising from effective performance."

The representation of possible expectations with respect to GS is adapted from Bandura.[61] Outcome expectations are associated with one's belief that a particular course of action will produce, for example, a giant swing. Doubts about or confidence in one's personal skill are termed "efficacy expectations."

Notice how nicely the representation in Diagram 1 matches the components of another quotation from Epictetus:

> Appearances to the mind are of four kinds.
>
> Things either are what they appear to be; (I've done it . . . no problem!)
>
> or they neither are, nor appear to be; (I've never done it and probably couldn't do it.)
>
> or they are, and do not appear to be; (I did it once but I don't think I can do it again.)

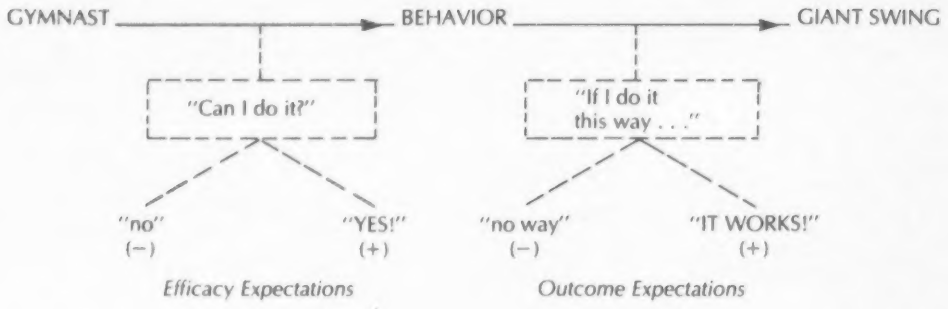

Diagram 1. Bandura's (1977) expectation model adapted for a performance of a giant swing.

or they are not, and yet appear to be. (I never did it but I think I can.)

Discourses (Chapter 27)

S_{19}: The Coach Might Review the Combinations Presented in Figure 5 and the Self-Statements Associated with Them. Each Athlete Will Probably Be Revealed to Have Particular Learning or Performance Traits Which the Coach Should Know and Understand

The personality characteristics of athletes are important sources of information for a coach. In gymnastics we talk about a "fear factor." The methods employed by the coach should be shaped to some extent by these traits. Morgan states, speaking of the predictability of trait theory, that "any dependent variable that accounts for 20-45% of the variance should theoretically be useful in predicting behavior if utilized in concert with other dependent measures."[62]

S_{20}: Know Your Athletes and the Way They Typically Cope with Stress

The gymnastic "fear factor" is in all probability normally distributed. At the extremes of the distribution we find at one end an excessively cautious gymnast with a relatively high degree of fear; at the other end is the carefree, daring type. The former will require extreme patience and carefully worked out progressions while the latter advances rapidly and needs adequate supervision so as to prevent accidents.

The following sections briefly explore some possibilities suggested by Bandura's four sources of efficacy information.

Performance Accomplishments

Participant modeling. Successful performance is the primary vehicle for the development of positive self-efficacy. A progression for the giant swing is therefore judged by the extent to which the performer achieves success at each step. Success reinforces self-efficacy and helps to reduce anxiety that may be associated with the movement.

S_{21}: Carefully Planned Learning Progressions Help to Reduce Fear

Performance exposure. It is important to practice under conditions which match, so far as possible, the competitive environment. Gymnasts always worry about the type of apparatus they will encounter at away meets. This sort of state anxiety can be reduced if the coach obtains advanced information including the specifications and floor locations of each piece of apparatus. When preparing for unusually different gymnastic facilities, the coach should plan practice sessions accordingly.

S_{22}: Practice Sessions Should Be Planned to Accommodate Contest Conditions

Orlick's discussion of this kind of practice desensitization is especially useful.[63]

Vicarious Experience

Observing another gymnast with similar skills is a common experience in the gymnasium. In terms of live modeling, the coach should make the most of novice performers as models for those who may feel hesitant or anxious about the giant swing. Experienced gymnasts often make poor models since they do not ordinarily exhibit behavior that parallels that of the "phobic" performer. Observing three or four different gymnasts with skill potentials that parallel those of the anxious observer tends to increase the power of the modeling procedure.[64]

S_{23}: The Modeling Procedure Not Only Provides the Observer with Information about Skilled Movements but It Also Has a Potential in the Reduction of Performance Anxiety

Verbal Persuasion

The use of suggestion in coaching is a weaker technique than actual performance experiences but there are times when cognitive processes are so burdened with dysponetic behavior that the coach must take the time to speak with the athlete. Where possible, negative self-statements should be reversed.

S_{24}: Make Your Athletes Believers

Emotional Arousal

Emotional arousal has been observed for centuries in the form of sweaty palms, increased heart rate, and "goose flesh." Such autonomic symptoms are often accompanied by increased dysponetic behavior. Fear generates fear and many of its signs are nonverbal.

S_{25}: Coaches Should Be Trained to Recognize Visceral Responses and Other "Nervous" Behavior

It should be re-emphasized that a fundamental premise of systematic desensitization is that emotional arousal is incompatible with relaxation. The viscera tend to "relax" reflexively as the muscles relax.

S_{26}: Highly "Emotional" Athletes Should Derive a Number of Benefits from a Course in Progressive Relaxation.

Conclusion

> Everybody knows what a good idea it is to relax, so there is a ready-made receptivity to relaxation programs. The effect of relaxation is, of course, much greater when a person has been trained to relax. But its greatest importance is not in relation to its *ad hoc* use, but in relation to its role in changing *habits* of tension."
>
> Joseph Wolpe[65]

This rather simple suggestion was offered by a therapist of long experience and his words have been uttered again and again by other professionals in the field of tension control. There is no difficulty accepting the suggestion; it is the implementation of the suggestion that poses enormous difficulties.

As there is no substitute for practice in the field of athletics, the techniques of progressive relaxation also demand serious practice. Abbreviated relaxation of the Wolpian type can be administered in selected interventions but it should be noted that such methodology is not designed to produce skilled relaxers. With appropriate changes in the curriculum, we may expect a majority of athletes to possess a foundation experience in tension control but we are far from such an ideal state at present.

In the short term, there are a number of things that coaches can do and many more things that they should think about. The coach should be willing to search for solutions *with* the sport psychologist to add to the list of "things that work." The middle person in sport represents the catalyst for this sort of interaction. Furthermore, it is important to ex-

amine performance per se to note those signs that signal dysponetic behavior during performance. A good deal of the work in sport psychology has been devoted to pre-contest and post-contest variables.

The coach has an important role in exerting the kind of leadership that is necessary to make some or all of the suggestions offered in this paper work in the gymnasium or on the athletic field. In the words of John Madden,

> I'm not the same crazy coach who used to storm up and down the sidelines. I've learned to relax!
>
> So should we all.

FOOTNOTES

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Coach's Reaction to Dr. A. B. Frederick's "Coaching Strategies Based upon Tension Research"

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Dr. Frederick's paper has evoked several reactions from me. As I read, my overriding thought was "To what end do coaches want athletes to learn to relax?" How can relaxation techniques and stress-reduction enhance performance and learning?" As a coach and performer, these kinds of questions must be asked about all of the techniques we attempt to use. It is true that most coaches take an eclectic approach to method. "If it works use it." But without critical thought to our purposes, we may tend to simply try this, and try that, because "this" and "that" are new, or because they are being used by others, with little or no consideration to the *purposes: enhancement of learning and performance*. If, after careful consideration, our professional judgment tells us that a technique has merit to enhance learning and performance, then we are obliged to try it and test it. Various relaxation and stress reduction techniques are an integral part of good learning and performance. Thus, they are an important part of the teaching/coaching/practicing methodology, and must be integrated into our training regimens, just as we integrate progressions for the learning of difficult movements and sequences. It is from this frame of reference, and from my experience as a gymnastics coach, competitor, and judge, that I have focused on the following eight observations.

1. Dr. Frederick has expressed that a coach needs to be personally skilled in tension control techniques. I wholeheartedly agree with him! The coach needs to be skilled in stress management for both his/her athletes and for his/her own sake.

The coach's responsibility is to prepare the athlete both physically and mentally for learning new skills and for competition. Included in the training program should be relaxation and tension control techniques so that the athletes can cope with the anxiety of stress. However, before attempting to teach others, one must have learned stress control for one's self. Tension control techniques can only be learned through self-experience. Without this, it is far more difficult to understand their potential and applied use. As well, it is difficult to convince our athletes that a somewhat different technique, relaxation, is important to them if they see us not able to utilize it for ourselves. The coach who is not able to control his/her own stress is not a very convincing model for the athlete!

The amount of emotional stress placed on the coach during workout and competition is tremendous. Many gymnastics coaches agree that they experienced much less stress when they competed than now as coaches. When they competed, they only had to perform on 4-6 events and were generally able to control their performances both physically and mentally. As coaches, however, they are unable to control their gymnast's performances and they "perform" emotionally with each of their gymnasts, 24-36 routines, in a competition. Consequently, the coach should also be

skilled in tension control techniques as a preventive health measure. No matter what our potential as coaches, we are of little value to our athletes when stress drives us out of our sports.

Also, as Dr. Frederick has pointed out, uptight, anxious behavior on the part of the coach can be sensed by the athlete and this may have a negative effect on athletic performance. Indeed, we can become one of the *sources* of stress for our athletes, adding an unnecessary burden to already difficult situations.

2. Finding time to teach an athlete relaxation techniques may be difficult for the coach, but the coach must teach the whole individual (both mind and body). Unfortunately, because there is "no time," many of our athletes are getting only pure physical training (strength, flexibility, endurance, technical skills) and no proper psychological education. The coach has the responsibility to teach an athlete both the physical and psychological skills so that he/she can perform at an optimal level. One must learn how to handle pressure if he/she is to compete well, especially now when everyone is training hard and success is determined by tenths or hundredths of a point or second. Thus, both mental and physical training are necessary to become a truly accomplished athlete. How then, can a coach neglect to teach "psychological gymnastics?" "No time to teach it," is a poor excuse. Most of the techniques, after introduction, can be accomplished with home practice. Thus, relaxation/concentration homework assignments should be incorporated into the training schedule. The few minutes of daily home training in relaxation/concentration techniques may help the athlete to relieve tension and fatigue, to be more alert, and to be able to better concentrate. I believe we must view the practice schedule in a much broader way. "No time" implies that we have only so many hours in the gym and that these hours must be used practicing "moves." Yet we build into our coaching schedules time for weight work, endurance work, etc. In similar fashion, we must build in psychological training.

Tension control techniques require practice and consistent application. Just reading about them will not do. Each individual must find the technique that will work for him/her. A committed athlete can and will practice the tension control skills at home which are effective and seem to fit individual situations.

3. Dr. Frederick shows concern that the great number of daring and difficult moves in gymnastics have greatly magnified the fear factor that each gymnast faces in daily workouts. The coach can reduce the fear-causing factors by

- teaching the basics thoroughly;
- applying the principles of learning progressions;
- preparing the gymnast both mentally and physically for the task;
- building confidence in the gymnast through repeated success;
- teaching tension control techniques.

4. In competition, there is another fear factor, the fear of "blowing it," that is absent in the practice due to a "nothing to lose now" attitude. How can one eliminate this upsetting mental condition? Both coaches and athletes agree that fear blocks out concentration necessary for success. We have all seen great athletes perform who are the "picture of perfect concentration."

I have seen Zoltan Magyar, Olympic Gold Medalist, achieve the highest state of singlemindedness and exclusive concentration and attention. This was at the 20th Gymnastics World Championship in 1979. At the finals of the pommel horse competition, Magyar was up after Nikolai Adrianov the Olympic all-around champion. Adrianov missed two elements in his routine and 10,000 spectators verbally reacted twice to the occurrence. Magyar was able to tune out all sounds and distractions. He was also able to shut out defeating thoughts such as "I hope I don't fall" and was able to synchronize and harmonize the forces of his mind and body to defend his Olympic gold medal on the pommel horse. According to the team physician, he didn't even realize that Adrianov missed! He was able to channel all his energy into a productive performance.

There are many techniques used today by athletes to achieve this high level of concentration ability and to reduce competition anxiety and tension. For example, modified autogenic training has helped many European and Soviet athletes to eliminate lack of concentration, lack of confidence, fear of errors, and fear of defeat. Consequently, it also helped them to control nervousness before and during competition.

The coach must train the athlete's mind to exert control. Concentration pushes distraction out of the mind and leaves it clear to deal with control. Lapses in concentration invite fear and self-doubt which block out concentration necessary for success. A vicious circle develops. Lack of concentration on the business at hand leaves room for doubts and fears to enter. Entertaining doubts and fears prevents concentration. Champion Jack Nicklaus, in his book *Golf My Way*, claims that his success is entirely due to practicing concentration and visualization. He first tunes out the world, then, gets into a state of concentration, followed by a mental visual rehearsal.

There are several approaches that a coach can utilize to help the athlete train for concentration and mental preparedness. For instance, the gymnast should develop "key points" that she must *concentrate* on during her *balance beam* routine in order to perform it well. During the flip-flop to back salto on the beam, the gymnast's key point for the back salto should be on his/her feet (contact with the beam) and take off from the beam, and not on the arm swing. The arm swing should be an automatic reaction. (Sometimes coaches teach the technique, concentrating on the arm swing, so that the gymnast develops a poor key point and, therefore, makes mistakes.) The next key point to concentrate on should be to focus and pull the scapulas together to stabilize the movement. Developing "key points" to concentrate on in the routine will fill the gymnast's mind and he/she will not have time for negative thoughts such as "I hope I don't fall." It should be pointed out, that the coach better know very well what the critical components are before he/she selects or helps the athlete select the appropriate "keys."

should be planned to approximate contest conditions. In gymnastics, for example, two of the most important stress-producing elements in a competition are the judges and the crowd. As the competition season draws closer, the coach must adapt team practice to take these sources of stress into account in order to prepare the gymnast for meets.

A good way to simulate a competitive atmosphere is to have an intramural meet. This gives the athlete an opportunity to perform in front of judges and a crowd. It is also helpful to have the gymnast participate in as many demonstrations as possible before a meet, to accustom her/him to an audience. "Workout competition" should be planned as a part of the training program. Each gymnast on the team should perform his/her routine with the same spirit as would be used in competition, with the coach as a judge and all team members as an audience. The coach should conduct many workouts as near to competition conditions as possible so that the first meet will be a continuation of the practice situation rather than a new and unsettling experience. Theories of transfer of training indicate that the more similar the "practice" situation is to the "test" situation the better transfer we can expect to occur. Isn't this what we are looking for? It does not do a bit of good to be able to perform a perfect routine in practice if this cannot be transferred to the competitive situation.

6. Differential relaxation is required for movement efficiency. Controlled relaxation, in which the muscles maintain sufficient levels of tension required for the activity while the muscles not directly involved are kept at a minimum level of tension, is essential to all skilled moves in all sports. This condition is described by Tutko as "staying loose." It denotes freeing oneself from unnecessary muscle tension and maintaining a state of optimum coordination and control.

The ability to relax unnecessary muscles is part of skill, of course, and comes about in part by practice. That is to say that as one learns a movement, the relaxation patterns are learned right along with the contraction patterns, in regard to space, time, and force. Sometimes I have wondered if we, as

teachers, don't put far too much of our time into working with "contraction" rather than with the "relaxation" side of the equation. If we work with the premise that proper patterns (space, time, force) of contraction can be brought under voluntary control, we can work with the same premise with relaxation patterns. Consequently, we should gear some of our teaching/coaching effort (cuing and progressions) to the relaxation side.

Research has shown that anxiety causes high degrees of uncontrolled muscular tension which makes coordinated motor activity difficult if not impossible. How can we teach our athlete to reduce anxiety in order to inhibit any extraneous muscular activity except for that needed for good physical performance?

Dr. Frederick refers to a few methods to increase the awareness of extraneous muscular tension and eliminate misplaced efforts, such as biofeedback, pinpointing the locus of desired tension, cuing the performance, rhythmic constructions, and breathing techniques. I have found coordination of breathing with movement to be a very effective tool for learning to contract and relax muscles in the required sequence. Proper breathing cadence also helps reduce anxiety, and improves timing and fluency in movements. For example, in the giant swing, selected by Dr. Frederick as an analogy for stress-related experience, the gymnast should inhale during the descent phase, hold his/her breath at the bottom of the swing, and exhale during the ascent phase of the swing. Psychologically, this will divert attention from anxiety-causing distraction to refocus on breathing, timing, and rhythm, which are very important parts of relaxed, natural performance.

7. Dr. Frederick has stated "Make a 'believer' of your athletes." The coach should have the ability to inspire belief in his/her athletes. She or he can generate that inner confidence, the sense that "I can do it" or "I have control." The coach also has an important role in developing realistic goals for success that are meaningful to the athlete. The coach and the athletes together must set goals. The goal-setting process should be two-fold: first, short range or immediate goal-setting, that is, something now almost within reach, a possible success near at hand, that develops the "can do" attitude which leads to a sense that long-term aspirations can, indeed, be met; secondly, long range goal-setting, aspirations of greater and greater success and ability. One can never set the long-term goals too high. Believing more, as has been shown by past great athletes, opens the door to unexpected excellence. Human potential may be limitless. As Dyer's best seller book for the last year points out, "The sky's the limit."

Belief affects performance and performance affects belief. In the end, the athlete no longer believes but "knows" that he or she is able to do it. The following short poem from an unknown author sums all of this up quite nicely:

If you think you are beaten, you are
If you think you dare not, you don't
If you'd like to win, but think you can't
It's almost a cinch you won't
Life's battles don't always go
To the strongest or faster man,
But soon or late the man who wins
Is the one who thinks he can.

8. Lastly, I would like to consider the question, "Which technique should be used for whom under what circumstances?" Many different psychological techniques have been developed and used by elite athletes to control tension, namely progressive relaxation, autogenic training, biofeedback, hypnosis, systematic desensitization, cognitive strategies, meditation, stress management training, and visio-motor behavior rehearsal. We know that the basic skill that all athletes must master is voluntary relaxation. But we do not know at the present which of the above methods is the best for an individual for a specific sport environment, which will bring the largest effects in the shortest time. Further research is needed in the area.

Nevertheless, available evidence tends to support the concept that athletes who psychologically prepare for a competition are capable of delivering more. It should be noted, however, that "psychological preparation" does not necessarily mean relaxation. For some, psychological preparation might mean mental practice, for others, meditation and

"centering." Research tells us that peak performance occurs at some "optimal" level of arousal. Indeed sometimes a coach needs to bring an athlete "up" rather than "down." As well, psychological techniques do not give an individual athlete more skill. Instead, they allow the athlete to perform to the best of his or her ability.

9

Hemispheric Dominance: Using the Right Brain in Sports

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Introduction

There is no question in the minds of superior athletes that the mental side of sports comprises as much as 90% of human performance. Yet, little progress has been made in the field of sport psychology toward articulating an integrated theory of how the brain actually functions so that peak performance is yielded in the realm of physical activity and sport.

There is much to be learned from Roger Sperry's research with split-brain patients in the 1950s and 1960s. Split-brain patients are those who have had the connecting nerve cable, the *corpus callosum*, severed, separating the two hemispheres of the brain. From the split brain research, we know that each of the two hemispheres specializes in its own separate mode of information processing.[1,2,3,4] The left hemisphere is the verbal, analytical, sequencing hemisphere, while the right hemisphere is the holistic, spatial, intuitive one. The left brain deals mainly with verbalization while the right brain is primarily concerned with images. It has recently been discovered that the right hemisphere is much more capable of processing holistic, spatial types of information that commonly exist in art, music, dance, and sport.[5,6,7] However, since the verbal, language-based hemisphere tends to dominate most cognitive functions regardless of whether it is capable, it often inappropriately dominates the processing of visual and kinesthetic information inherent in movement.[8]

There are, however, important exceptions to what has been mentioned as the most common type of brain lateralization. Some right-handed individuals show a pattern of lateralization of verbal information to the right hemisphere. All tests for left/right lateralization show that females and left-handers are less lateralized than males.[9,10] About 70% of all left-handers appear to have language in their left hemispheres like most right-handers. Of the other 30%, 15% have it in the right hemisphere and the remaining 15% have language divided about equally between both hemispheres. Left-handers who have no history of left-handedness in their family tend to have language in the left hemisphere just as the majority of right-handers. Thus lateralization is consistently related to hand dominance.

The genetic programming for differential lateralization of the hemispheres of the brain becomes obvious at birth. The one mental difference between males and females that most experts can agree on is that females are superior at verbal tasks (left hemisphere) and males are superior at visuo-spatial tasks (right hemisphere). One clear biological difference between males and females is the rate of myelination and maturation of the nervous system and lateralization of the brain. About five months after conception, the female embryo is already two weeks ahead of the male.

At birth the female baby is about four weeks more advanced than the male. As development continues, the female talks, walks, reaches puberty, and maximum growth earlier than the male.[12] The varied patterns of lateralization shown by individuals of different sexes may well account for any unique cognitive strategy for coping with the environment between the sexes.

Without actually understanding or articulating the unique function of the two hemispheres of the brain, Gallwey[13] and other "inner sports" proponents[14] have discovered a method of instruction for tennis, skiing, and other sports which apparently causes a greater shift of the performer into the right hemisphere mode of processing. Gallwey's Method is to minimize verbal instructions and to limit self-degrading verbal criticisms, thus permitting the right, holistic, imagining hemisphere to take over. He has discovered that individuals can learn tennis and other sports much faster and with less anxiety over imagery rather than verbalization. Moreover, Edwards has used the right hemisphere mode of information processing with art students and has found amazing results in the stress-free progress of her students.[15]

Thousands of great athletes have reported that their greatest performances in sport occur when they are not thinking about anything at all. Their concentration is focused on the "here and now" during peak performances and they are not preoccupied with verbal judgments of themselves or their performance, thereby using the full power of both hemispheres of the brain simultaneously.

Coinciding with the "inner sport" revolution has been the revolutionary use of various types of relaxation techniques, e.g., transcendental meditation, yoga, visuo-motor behavior rehearsal, and autogenic training, to enhance concentration and alleviate stress in sport and other fields. A combination of relaxation techniques and visual imagery has been reported to yield amazing results in sport performance, rehabilitation of injuries, acceleration of learning in various academic areas, and even cancer remission in the medical field.[16,17,18,19,20]

Actually, the use of relaxation techniques with visual imagery is nothing new. Three thousand years ago, Eastern men of wisdom discovered techniques for silencing verbal thoughts, thereby tapping nonverbal consciousness and shifting hemispheric dominance to the right hemisphere. Thus, Eastern instructors place a great deal of emphasis on reducing verbalization during training.

Relaxation training and visual imagery techniques can increase the performer's ability to use the right hemisphere function to the fullest potential in sports. This greater shift to right hemisphere control can allow a state of mind which yields stress-free information processing in the appropriate hemisphere for movement. Accordingly, the intent of this paper is: to review the literature on split brain research and hemispheric function; to use information from hemispheric function studies to support the concept of more consistent shifting to the right hemisphere for enhancing sport performance; to demonstrate that the right hemisphere represents a common bond for several types of stress-reduction techniques; to suggest ways in which right brain activity can be increased in sport.

Functions of the Left and Right Hemispheres of the Brain

Nineteenth century scientists labeled the left hemisphere the dominant mode and the right hemisphere the subordinate mode.[21] Until recently, the right hemisphere has been viewed as less advanced, less involved in higher cognitive processes, and dominated by the left hemisphere.

Researchers in the 1950s and 1960s discovered that, in actuality, both hemispheres contribute to thinking, reasoning, and complex cognitive processes.[22,23] However, each hemisphere has a unique mode of thinking and memory. The left hemisphere mode is logical, sequential, and verbal; the right hemisphere mode utilizes sensory, nonverbal, and holistic images. The right hemisphere controls the left hand and left visual field, while the left hemisphere controls the right hand and right visual field. However, the two hemispheres are connected by a thick band of neural fibers, the *corpus collosum*, which

allow communication between the two independent modes of information processing.

Gazzaniga undertook the task of studying the two separate modes of processing.[24] In his experiment, two different pictures were flashed for an instant on a screen, with a split-brain patient's eyes fixed on a midpoint so that scanning both images was prevented. A picture of a spoon on the left side of the screen went to the right brain; a picture of a knife on the right side of the screen went to the left brain. When asked to name what had been flashed on the screen, the patient verbalized, "knife," based upon the left hemisphere's perception. When asked to reach behind a curtain with his left hand (right hemisphere) and pick out what had been flashed on the screen, the patient picked out a spoon from the group of objects. When asked what he was holding, the patient responded with a confused look and said, "a knife." The right hemisphere, knowing very well that the answer was wrong but not having sufficient words to correct the verbal, articulate left hemisphere, continued the dialogue by causing the patient to mutely shake his head.

Ornstein in his book, *The Psychology of Consciousness*, has provided a clear description of the differences in information processing between the two hemispheres.[25] As evident from Ornstein's description, the left hemisphere is more appropriate for processing verbal, analytical, linear types of information such as that which is inherent in mathematics, language, reading, or writing. Whereas the right hemispheric function is obviously best suited for holistic, intuitive, simultaneous, and instantaneous processing of information required in art, music, dance, and sport.

The following description from Bry provides a useful analogy of how the two hemispheres function.[27] Imagine a long freight train moving down a railroad track as seen from two different vantage points. The first viewer is standing about three feet from the track and each part of the train can be seen from moment to moment as each part passes:

Function of the Two Hemispheres[26]

The Left Side	*The Right Side*
Connected to the right side of the body, and the right side of each eye's vision.	Connected to the left side of the body, and the left side of each eye's vision.
Deals with inputs one at a time.	Demands ready integration of many inputs at once.
Processes information in a linear manner. Has a lineal and sequential mode of operation.	Processes information more diffusely. Has a nonlineal and simultaneous mode of operation.
Deals with time. Responsible for the faculty of verbal expression, or language.	Deals with space. Responsible for gestures, facial and body movements (or "body language"), tone of voice, etc.
Responsible for verbal and mathematical functions.	Responsible for spatial and rational functions, awareness of our bodies, for sports and dancing, our orientation in space, recognition of faces, artistic endeavor, musical ability, and recognition of pitch.
specializes in memory and recognition of words or numbers.	Specializes in memory and recognition of objects, persons, and places, music, etc.
Normally tends to specialize in logic and analytical reasoning or thinking.	Normally tends to specialize in intuition and holistic perception or thinking.
The seat of reason.	The seat of passion and of dreams.
The crucial side of the brain for wordsmiths, mathematicians, and scientists.	The crucial side of the brain for artists, crafts people, and musicians.

first the engine, then the first car, then the second car, and so on, until finally the caboose passes. The left, logical hemisphere functions much like this example.

Imagine a second viewer watching simultaneously, but high up in the air in a helicopter or balloon. From this vantage point, instead of seeing one car at a time, the airborne individual sees the whole train all at once. This intuitive, holistic view is a good example of how the right brain functions.

Because of the right hemisphere's inability to verbalize, it has been unfairly labeled the "unconscious mind." Perhaps a better choice of words would be the "nonverbal" mind. The right hemisphere strongly influences behavior, but individuals have great difficulty explaining its actions in verbal terms. In the unconscious mind (right hemisphere), billions of neutral cells are capable of millions of separate but simultaneous operations. The right hemisphere regulates such autonomic functions as breathing, cell reproduction, heart rate, and metabolism. Creativity and self-image or self-awareness are also thought to reside within the right hemisphere mode of processing.[28,29,30]

Damage to the right hemisphere leaves language intact, but like a computer. Literal meaning is understood, but metaphor, inflection, emotional meaning, facial expression, and body language are not. The individual becomes spatially disoriented, and has great difficulty with simple tasks such as putting the shoes on the correct feet. On the other hand, damage to the left hemisphere causes a loss of verbal ability, but conscious thinking, emotion, and nonverbal actions remain unimpaired.[31,32,33]

Since the right hemisphere is responsible for processing nonverbal, spatial, and visual information, it is capable of processing large masses of data in parallel without separate analysis of each factor. Verbal processing is much more difficult because it requires more memory space than the visual imagery stored by the right hemisphere.[34]

When a normal person performs a manipulating task such as the Block Design Test, the right hemisphere clearly processes the information. According to Haber, the right hemisphere is faster and less easily fooled by missing or altered details of lighting, distance, or orientation.[35] If a recognition task is extremely difficult and complex, a clear right hemisphere advantage in processing occurs.

It has been postulated that asymmetrical development of the two hemispheres specifically occurred throughout the evolutionary process to keep them separated. The two different modes may sometimes interfere with each other to prevent maximum performance. More commonly, the left verbal interferes with the right nonverbal hemisphere.

The most efficient performances in all areas of human endeavors occur when the two hemispheres cooperate to contribute each one's mode of processing to the task best suited to its abilities.[36,37,38] The split-brain studies have shown, however, that the left hemisphere tends to dominate even when it is not the appropriate one to solve the problem.[39,40] One of the most significant contributors to stress in learning or performance is the inefficient processing of task-related information because of too much dominance by the inappropriate hemisphere. This inefficiency in processing content from the environment is very frustrating and stressful, because it inhibits individuals from being successful in achieving their goals.

Thus, one of the most exciting discoveries from the split-brain research is that each hemisphere has its own awareness. Each hemisphere has unique sensations, perceptions, cognitive processes, learning experiences, and memories. Indeed, unique but overlapping archives of knowledge reside within each hemisphere. Although one cannot consciously think in both hemispheres simultaneously, it is possible for the more active one to use the less active one on an automatic level.[41,42,43]

Scientists have estimated that individuals use less than 10% of their brain power. Could such inefficiency be related to the fact that our conventional methods of inputting information into the brain and processing it are inefficient? I believe that a plausible explanation. The logical conclusion is that we must capitalize on the right hemisphere's capabilities, so that we all might increase our

mental capacity by at least 50%.

Right Brain Function in Sport

Edwards has discovered a remarkable new stress-free method of teaching art. The method provokes students to shift from the verbal, logical, analytical, left-mode into the spatial, holistic, visual mode of the right hemisphere. This method has been proven effective with art students of all ages, levels of ability, and degrees of brain lateralization.[44] Edwards has observed that teaching art is much like teaching someone to ride a bicycle—both are difficult to express in verbal terms. It is as difficult to explain to an art student how to perceive as it is to explain to someone how to balance on a bicycle. Instructors are likely to resort to instructions such as, "Watch while I get on and *show* you!"

Edwards has postulated that the right-mode shift represents a slightly altered state of consciousness or what artists refer to as being at "one with the work." In this state, artists are able to grasp relationships that ordinarily seem impossible to understand. There is a feeling of alertness, awareness, relaxation, and freedom from anxiety.[45]

The left-to-right shift in art is manipulated by having students look at a painting or drawing upside down. In the familiar right-side-up orientation one is restricted by the memory store of the left hemisphere which labels, categorizes, and verbalizes. In the up-side-down orientation, the left brain becomes confused by the complex pattern and cannot verbalize or label, so it passes the job over to the right hemisphere which deals more efficiently with shapes and areas of shadow and light.

Similar higher cognitive functioning may be involved in other performing arts, i.e., sports. By shifting to the right mode, access is gained to the inventive, imaginative, intuitive powers of the right hemisphere that have largely been untapped by our verbal technological society and educational system. In drawing or other types of human performance, our old habits and preconceived ideas about what *should be* often interfere and restrict our ability to fully use our potential to see what *can be*. Thus, we need to reach out and go beyond our present restrictive practices of attempting to reach our maximum human potential.

Many teachers, authors, researchers, and athletes have alluded to the use of the right hemisphere in sport either directly or indirectly. There is a great need for a theoretical integration in the field of sport psychology of what now exists as rather fragmented reports and studies concerning this phenomenon. The field of sport psychology has done little to study the problem. Recently, Blakeslee has presented in his book, *The Right Brain*, a fascinating explanation of using a right brain approach to the performing arts.[46]

Much of the anxiety and negative stress in sport is created by ourselves. We are our own worst enemies. We let our left hemisphere interfere too much and suppress the right hemisphere from automatic control of our movements in sport performances. The right hemisphere mode is efficient in processing movement because it has a holistic image of how parts exist in space and fit together into a holistic pattern. The intuitive, subjective, relational holistic, time-free right mode can still communicate, even when something is too complicated to express verbally. Both visualization and imagination are important skills in sports.

Most individuals have built up a lifelong habit of acknowledging only thoughts that can be expressed in verbal terms. However, there are many instances in physical activity and sport where thoughts cannot be expressed in words. If you were to ask two school children how to perform a jumping jack, most likely they could not verbally explain it. Most likely they would watch each other perform, and then try to verbally extrapulate from watching the visual images.

In movement, thinking consists of manipulating and rearranging mental images. Athletes learn to think directly in kinesthetic movement images. They develop a "feel" for certain basic movements. The process of combining basic movements and solving movement problems is called "kinesthetic thinking." To some degree this mode of thinking is used in conjunction with the verbal

thinking of the left brain. Teachers and coaches need to understand this quasiduality of their students' minds. Classes and practice sessions should be conducted in such a way as to respect intuition and nonverbal thinking. An effort should be made to develop the cognitive abilities of both sides of the brain (verbal and nonverbal). If the nonverbal mind is ignored too much it pays less attention, learns less, and gradually becomes less competent in maintaining a balance with the verbal mind. Thus, teachers and coaches should avoid relying exclusively on words or formulas. Gestures, demonstrations, and pictures are effective ways to communicate to the nonverbal mind. Very often a "picture is worth a thousand words."

Much of what is verbalized by instructors is an exercise in frustration and anxiety for the learner. Many athletes have told me of instances where they did not know what their coach meant, but were afraid to ask. For example, a place kicker might be chastised, "Your leg was not high enough!" What does this mean?

Since abstract words evoke no visual images, instructors need to be careful what they say to students and athletes. In sports there needs to be greater awareness of this, so instructors can create more realistic, accurate images as students learn. Imagery is a much more efficient means of information storage in the brain. One good correct image is far better than tons of verbage which clutter and restrict the performer's mind. From simple observation of himself and his students Gallwey in *Inner Game of Tennis* has stated that both instructors and performers verbalize and criticize excessively.[47] Unless instructors or coaches are poetic, they usually provide a pitiful verbal representation of what they actually want their students to visualize.

Although the "inner sports" concept makes no reference to left and right hemispheres, it is a sound application of related principles. What Gallwey calls Self 1 and Self 2 are equivalent to left and right hemispheric processing, respectively. The basis of Gallwey's approach is to suppress the verbal criticizing (Self 1) and permit the imaging self (Self 2) to play the game. Gallwey uses verbal instructions only where useful and avoids verbal descriptions of the actual movements. Visual and kinesthetic images are used to teach a nonverbal understanding of the required movements.

Because the right hemisphere thinks in visual images, it has a tremendous advantage for recognizing and manipulating complex visual patterns such as those commonly found in sport. When *totally absorbed* in nonverbal activity such as skiing, jogging, or swimming, one's verbal consciousness is automatically switched off. The problem lies in the fact that performers are seldom "totally absorbed" nonverbally.

On the court or playing field, most people wage a running battle with themselves as they participate in tennis, golf, racquetball, or other sports. After a bad shot or performance, individuals typically become angry and berate themselves. This increased verbal criticism actually causes greater stress because the left hemisphere inappropriately attempts to control the situation. Thus, a frustrating cycle is established in which performers criticize themselves more and more while performance steadily decreases. Since the left hemisphere mode is too slow and systematic to be useful during actual performance, it should yield control to the right hemisphere for action.

Much of the performer's self-imposed stress is created by a strong intent to fulfill habitual expectations and preconceived notions of correct performance. By thinking too much and trying too hard, the performer will often experience awkwardness, frustration, inconsistency, and stress.

The inner game is usually played against such obstacles as self-doubt, nervousness, lapses in concentration, and self-condemnation. Being aware of the inner game is the first step toward overcoming all of the barriers which create stress and inhibit our excellence in sport. All of the inhibitors are usually what cause a performer to fail. It is the present author's contention that the best cognitive strategy for coping with the pressures of sport lies within the information processing powers of the right hemisphere of the brain.

Performers experience their greatest lapses

in concentration when they allow their mind to project into the future or the past. This causes them to live in a world of "what if's" instead of "what is." Actions needed for the present have their best chance for success when the mind is focused on the here and now.

The logical mind is fine for mentally recognizing mistakes of the past and planning for the future, so as not to commit the same mistakes. Verbal instruction has an important role to focus attention on relevant cues in between critical aspects of performance. Optimal performance occurs in the present moment. In sport, the isolated frozen moment of the present stands between two eternities of the past and future. Thousands of prominent, superior athletes have reported that their best performances occur at times when their mind is empty and they are not thinking at all.

Truly, many of the complex maneuvers in sport are a marvel of instant calculation involving instantaneous parallel processing of the right hemisphere. The key to top performance is to lock into the intuitive, nonverbal processing of the right hemisphere. Nobody does it better than football player O. J. Simpson. In an interview when asked what he thought about on one of his great runs, O. J. replied:

> Nothing. My definition of a good runner is that he's insane—he does wild things, stuff you never see, and he does it spontaneously. Even he doesn't know what he is going to do next. All I know is that when I'm running well, my mind just goes blank. I'm not thinking about anything at all. Thinking is what gets you caught from behind.[48]

To the interviewer's further question if O. J. meant he was unconscious, O. J. replied:

> No, even though I'm not thinking, I'm aware of everything. I may run sixty yards without a thought, but when I get to the end zone I can tell you where everybody was, and who blocked who. And I mean not just the guys near me, but all over the field.[49]

Clearly, to play unconsciously does not mean without consciousness. It simply means that the verbal side is inoperative, not thinking, not trying too hard, and not interfering with the right hemisphere's function. Things seem to happen automatically, effortlessly. When performers start thinking, analyzing, and verbalizing excessively they may suffer from what is commonly termed, "paralysis by analysis." In such instances, timing and fluidity will be lost and performance will suffer.

Commonalities among States of Altered Consciousness

In recent years there have been volumes written about altered states of awareness in all fields of human endeavor. Characteristics and descriptions of the runner's high, positive addiction, peak experiences, meditation, and flow (heightened creativity) all bear a remarkable resemblance. Could it be that they all reside in the right hemisphere of the brain? Is there a common mode of processing or mechanism of brain function underlying all these unique experiences? Perhaps the terms used are just different words which describe the same phenomenon.

Very often runners reach a state of mind called "the runner's high" defined as a "euphoric sensation experienced during running, usually unexpectedly, in which the runner feels a heightened sense of well-being and transcendence of barriers of time and space."[50,51] Glasser has termed the state of mind experienced during running as "right brain" concentration. He has contended that running provides a classic meditative state in which the left brain switches off, thus permitting the right brain to dominate.

Glasser has also postulated a theory called "positive addiction" in which he suggests that running and many other activities may become addicting if certain qualities exist. One noteworthy quality is that an activity must be done without a need to criticize oneself. As Glasser has stated, "If you can't accept yourself during this time, the activity will not be addicting."[52]

These positive addictions usually involve "a trance-like, transcendental" mental state that accompanies the addictive exercise. Glasser has postulated that this state is the one that exercisers reach directly and that

meditators reach indirectly.

At first glance, Glasser's concept of running as a meditative, right hemisphere phenomenon, may appear in conflict with Morgan's work on association/dissociation of marathon runners.[53] However, I believe these concepts are in harmony. What Morgan describes as "association" is the runner's ability to monitor or be aware of precise bodily functions during the run. The concept of association actually fits very nicely with the "runner's high" concept of a state of greater internal awareness. World class marathoners associate more consistently and also report more frequent experiences of the "runner's high" than lower level runners. Morgan's concept of "dissociation" where the runner (usually of lower caliber) distracts himself/herself by outer environmental factors is actually a process which activates the verbal mind or left hemisphere. For example, the runner solves mathematical problems, mentally builds a house, or thinks about solving other problems.

The phenomenon of "peak experiences" has been described by Maslow as follows: "There is greater integration than at other times, peak power, effortlessness and ease of conditioning, free of inhibitions, more spontaneous, expressive, more creative, feel the here and now, free of past, nonstriving, nonneeding, completeness, or closure of the act.[54]

The characteristics of the greatest moments of athletes are also "peak experiences" in sport. Ravizza has studied these sport experiences extensively.[55] Eleven qualities were consistently reported by athletes: nonvoluntary; temporary; total immersion in the experience; temporary transcendence of self; unique experience; perfection of the sport experience; total control of the situation; loss of fear; effortlessness; self-validating; complete control and execution of basic skills without thinking about technique. Literally, thousands of athletes have experienced a certain quality of intensity and release as they have tried to push against their psychobiological limits. Risk-taking sports have especially caused some athletes to extend themselves toward their absolute physical, emotional, and intellectual limits. Ogilvie has shown that such athletes are highly intelligent, highly creative, and possess very stable personalities.[56]

Some of the great geniuses of our time, Einstein, Mozart, Russell, Tchaikovsky, Darwin, Shakespeare, Picasso, Planck, to name a few, have acknowledged that their most creative ideas have emerged as spontaneous nonthinking inspiration. The artist, surgeon, composer, writer, inventor, actor, or athlete often feels complete unity with the activity. Csikszentmihalyi has termed such experiences as "flow" experiences.[57]

The characteristics of flow are described as follows: centers attention; loss of consciousness; pleasure gained from the activity itself instead of some external reward; skills are sufficient for task demand; time appears to pass faster. An entire story or event may flash in a matter of seconds.

However, according to Csikszentmihalyi, the most typical kind of flow experience is play, and games are the most common forms of play activity. Excellent descriptions of "flow" in activities have been given by Murphy in his book on golf, Herrigee with regard to Zen archery, Abrahams on chess, and Unsworth on rock climbing.[58,59,60,61] What Maslow has called "peak experiences" and deCharmes has called the "origin" state, share many distinctive features with the concept of "flow."[62]

If play is indeed the most common avenue for flow experiences to occur, Czikszentmihalyi's concepts should cause physical educators and sport psychologists to seriously question the highly structured, restrictive, professional model of sport which is frequently imposed on children in play activity in this society. Harris discussed the flow concept in relation to building intrinsically motivated cognitive and affective behaviors of children in sport.[63]

Eastern men of wisdom, martial arts, and meditators have known for at least three thousand years that emptying one's mind of verbal thoughts greatly enhances performance. In most endeavors involving movement, the Eastern philosophy has incorporated relaxation techniques and/or meditative techniques for mobilizing energy and increasing awareness and concentration. Martial ar-

tists call the flowing energy "ki," Chinese call it "tao," and Japanese call it "zen." Eastern philosophy of sport is the antithesis of the Western "uptight," "win-at-all-cost" philosophy.

Finally, there is a great deal of controversy as to what is meant by "altered states of consciousness." Marsh defines consciousness as "the awareness of what passes in one's own mind."[64] Could this mean that those concepts which we can verbally describe are considered consciousness, whereas those concepts which cannot be verbalized are unconscious? I am in complete agreement with Gowan's somewhat bold definition of an altered state as "any state where the left hemisphere function is in abeyance."[65] If all the great moments in sport are indeed right brain experiences, then they may as well be classified as altered states, free from stress and flowing!

Relaxation Techniques, Visual Imagery, and Right Brain Function

In the last twenty years much attention has been given to the physical and mental benefit of relaxation techniques and visual imagery training. Scientists have written volumes in reputable scientific and medical journals on yoga, transcendental meditation, Shultz's relaxation technique, biofeedback, antogenic training, attention control training, visuomotor behavior rehearsal, and the relaxation response.[66,67,68,69,70,71,72,73,74,75,76,77]

In the Western world scientists have recently begun to investigate ways of using some of these techniques to help athletes harmonize their minds and bodies for superb performance. There is rising evidence that our logic-laden culture has trained away, suppressed, or even distorted many of our natural talents in art, sport, music, and dance.[78,79,80,81]

To date, no one has proposed an integrated theory to explain why a combination of relaxation techniques with visual imagery has proven to enhance sport performance, rehabilitate injuries, speed recuperation from illness, and even cause cancer remission. Is there an underlying mechanism in the brain which is the key to these remarkable events? It is my hypothesis that relaxation techniques and visual imagery enhance the use of the right hemisphere's potential. Relaxation techniques enhance the vividness of visual imagery. Vivid imagery training enhances the inner awareness of the right hemisphere which also assists in the control of the autonomic functions of the body. The right brain stores both perceptive and imaginative information as reality. It has a difficult time distinguishing what is really "real." The perceptive store of the right hemisphere contains the sensory information that one perceives from reality. The imaginative store is just as powerful and stores very clearly in the mind, those events that are visualized.

In her recent book, *Supermind*, Brown has stated that imagination is the most neglected and underdeveloped of the normal abilities of the human mind.[82] With imagery (right hemisphere), human beings have the ability to create and recreate mental pictures of situations and events that are not actually present.

During the 1960s the Soviet Union and East Germany employed a technique called "psychic self-regulation" to sport performance. It is based on the knowledge that human beings can control, through imagination, various physiological processes, including pulse, muscular relaxation, blood pressure, body temperature, and breathing.[83]

The more precise and specific the image, the more specific the body's reaction. The image, excites exactly those physical mechanisms of the body needed for normal action. Imagination can make the body work by preparing nerves, muscles, heart, and mind to unify their physical actions toward a single-minded, determined objective.

Vivid mental, visual rehearsals that almost duplicate actual physical performance become a reality in the subconscious mind (right hemisphere). If an athlete has never actually shot twenty out of twenty free throws but strongly desires to improve the probability of doing so, he/she can mentally visualize, as well as physically practice them. Mental rehearsal is very effective because it prepares the right hemisphere. Most world-class athletes make it a point to forget as quickly as possible how they made their mistakes. Their emphasis is on replacing mistakes with correct images.

Because of the principle of reinforcement, as the performer prepares for competition, thinking about excellent performance will increase the probability of producing excellent performance. For that same reason, thinking about mistakes is likely to have a negative influence on performance. Anxiety usually stems from some internal conflict such as fear of failure. Therefore, performers who wish to succeed should visualize success. Likewise, teachers and coaches should be careful not to reinforce images of poor performance in the minds of their athletes.

Almost all tennis players have experienced playing "over their heads" right after watching championship tennis on T.V. The benefits of seeing top level performers in action are not from analyzing their strokes but from unconscious absorption of the images that are presented. There is no doubt, in my mind, that learning takes longer without exposure to effective models for the aforementioned reasons.

The Chinese have used visualization and effective role models to advance their national team in archery. Their program for women has involved selecting adolescent athletes (ages 12 to 14) from sports like javelin or discus throwing. These athletes already possess well-developed shoulder girdle strength. Then, the chosen athletes observe films or actual performance of top caliber archers for a period of about three months. Next, they practice the draw mimetically with bows that are unstrung and visualize the arrow going into the center of the bull's eye. It is literally six to eight months before they are allowed to actually shoot arrows at targets. Imagine such patience in training athletes in the West!

A positive mental image can help anyone with any type of performance whether public speaking, art, music, dance, sport, business, or architecture. Gunfighters in the Old West, circus performers, and martial artists have used visual imagery just as extensively as physical trainers.

Thousands of great athletes have used visual imagery and positive self-efficacy to their advantage: Babe Ruth; Bruce Jenner; Arnold Swartzenegger; Ben Hogan, Bill Russell; Dick Fosbury; O. J. Simpson; Jack Nicklaus; Billie Jean King; Jean Claude Killy; Vesma Grinfelds.[84,85,86] Jack Nicklaus, for example, claims that hitting good golf shots depends 10% on his swing, 40% on his set-up and stance, and 50% on his mental conception.[87]

Sport constantly shows us how the verbal mind (left brain) imposes barriers on what the right brain can do. This mental barrier, this collective tendency to set a limit on human performance is what needs to be overcome. Time and time again, as one athlete has broken through a barrier, other athletes have followed, showing that the barrier was mental, not physical, Roger Bannister first visualized breaking the four-minute mile before he actually broke it. Within three months, twenty other runners had also broken the barrier.[88]

A similar example occurred in the 1976 Summer Olympics when a weight was lifted, heavier than any human had ever hoisted. In weight-lifting, 500 pounds had long been an impenetrable barrier, like the four-minute mile. Alexeyev, the famous Russian weightlifter first broke the 500-pound mark with 501½ pounds. He was also a master at visual imagery, so it is little wonder that a few years later he hoisted 564 pounds.

The world's greatest athletes have learned to use mental techniques because they have persisted at the sport long enough to discover these principles. I believe research in this area can contribute greatly to condensing the time required to master these skills and sorting out the precise techniques that work best. Technology such as electroencephalography (EEG) and electromyography (EMG) can be employed to research the mechanisms of functioning in the brain and body.

In most individuals, the left hemisphere shows more electrical activity than the right hemisphere because it is the hemisphere that controls verbal function. This dominance of cognitive activity by the left hemisphere is reduced and removed altogether with training in relaxation and meditative techniques.

A study of some 3,000 meditators has shown an EEG pattern which is more bilateral, symmetrical, and integrated. Such techniques apparently promote a more integrated, balanced functioning of the two hemispheres of

the brain.[89] Thus, the right hemisphere has the chance to provide more input into situations where it can appropriately be used (sport being one of those appropriate situations).

There is some evidence that in stressful situations, there may not be an efficient shifting back and forth to the appropriate hemisphere for processing. This may explain the debilitating effects of stress on all skills. Relaxation techniques and visual imagery may indeed enhance the balance of activity between the two hemispheres.

Coaches and athletes all over the world are already using selected mental techniques to enhance physical performance. These various techniques can be used to prevent stress and enhance self-control of arousal through appropriate cognitive strategies, i.e., right hemisphere functioning.

One of the greatest contributions sport psychologists can make to sport is to disseminate some of the knowledge that scientists now have available on mental training. Those who really need to know and use this information are those at the grass roots level in sport. Moreover, there is a need for further study to find ways to simplify techniques so that results can be seen in the shortest amount of time. In this country we are still at a stage where there is something magic about a certain number of hours of physical practice each day. There is a common belief in *quantity* of physical practice, rather than *quality* of physical and mental rehearsal. Basically, I believe athletes are overworked physically across this nation, especially those in youth leagues, junior high school, high school, and college. If one so much as suggested a fifty-fifty split between physical and mental training, most coaches would think the suggestion was outrageous. How can anyone realistically leave the mental aspects of sport to chance? Unfortunately, that which is currently being taught to athletes, especially at the younger ages, is mostly a chance occurrence.

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Coach's Reaction to Dr. Evelyn G. Hall's "Hemispheric Dominance: Using the Right Brain in Sports"

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Introduction

The alarming assassination attempt made on President Reagan indirectly resulted in sudden national awareness of the importance of brain function. The injuries sustained by James Brady became public interest illustrations of the control mechanisms directed by the right and left hemispheres of the brain. Her paper provides a real challenge to sport scientists to conduct specific research designed to answer the all-important and frequent question asked by the physical educator/coach: "So what?"

My reactions reflect my own work based in physiology and psychology, as well as my experiences as a physical educator and coach. It appears Dr. Hall's position regarding the use of the expressive right brain in sports is a concept which is intuitively reasonable. Her theory is an interesting, refreshingly new approach to several psychological parameters of sport. However, I would suggest that the principles of specificity of training should be interpreted very carefully. Specificity of training means the individual must focus training techniques toward the sought goals. For example, in endurance sports it is essential to exercise at 75% of one's maximum capacity to excel. Parallel, but unique principles are important in skill acquisition, mental concentration, and competition performances.

To efficiently reach one's goals, three steps should be followed in keeping with the specificity principle: an accurate evaluation must be made to determine what currently exists; realistic goals should be set to establish precisely the desirable outcomes of training procedures; a goal-directed program should be designed for specific, logically-ordered, progressive improvement. From this premise, I will establish a hypothetical regression "line of best fit" between Dr. Hall's position and a practical statement regarding: efficiency of skill acquisition for our students and consistencies of peak performance for our athletes.

Efficiency of Skill Acquisition

Dr. Hall's discussion on right brain theory can be appropriately applied to skill acquisition considerations only under certain specific conditions. I am not certain that the physical educator should teach beginning students the "feel" of a motor skill through imagery modes of demonstration, pictures, and videotape display. One unique aspect of our chosen profession is that our students learn by doing. However, precise verbalization is necessary so that the beginner has a cognitive understanding of where all body parts should be. Internal self-dialogue is important for novices so that they can make the transition from verbal awareness of what is to the feeling of what *was* a correct movement.

Fitts[1] describes the performance of motor skill learning as progressing through three stages: cognition; fixation; automation. I propose this model as a simple frame of reference for right hemispheric dominance. During the

cognitive phase of acquisition, the learner gets the general idea of what the performance entails. Application of the whole-part-whole method of teaching seems most efficient during this phase. The student is shown the skill (for example, a forward roll). We have theoretically presented the image to the right hemisphere. The instructor now talks the performer through the skill: "Flex your knees so that you are squatting down. Place your hands on the mat . . . etc." After the movement has been completed with the aid of verbal direction, the student should be shown the whole desired movement again.

Thus the athletes know precisely what they must do to accomplish the movement that has been verbally labeled the "forward roll." As they attempt to repeat the skill, initially they should internally talk themselves through the skill as the coach did. These verbal cues are exact, precisely descriptive and will guide the learner to concentrate on what should be done in a step-by-step order and direct him to precisely that which should be accomplished.

Once the child gets the general idea he or she repeats the roll to correct and refine the motor action. This error reduction phase is fixation. At this point, the instructor gets the performer to recognize the correct "feel." That is, the instructor begins teaching the transition and integration of hemispheric contributions in directing the movement. This should be done by specifically calling the child's attention to precise movements of the body parts. I believe that verbal communication is still the most efficient way to accomplish integration of hemispheric control.

The instructor must verbalize: "Where is the back of your neck compared to your toes? etc." Since the child is actually performing as he/she is receiving cues, time for activity is not lost viewing demonstrations. The child is using the left, verbal hemisphere to interpret directions and simultaneously is feeling the respective image using the right hemisphere. As the performer becomes more and more proficient in executing the forward roll and the fixation phase progresses, theoretically the messages of the right hemisphere's become increasingly predominant and effective.

Once you have determined that the performer has learned a perfect forward roll; that is, the movement is rapid, automatic, and error-free, the student has reached the so-called automation phase of execution. Intuitively, I would say it is at this performance level where actual internal dialogue can be eliminated to allow the nonverbal right hemisphere to direct the entire task. It is at this highest level of performance that cognitive evaluation occurs following rather than during the movement.

Consistency of Peak Performance

Peak performance in itself suggests that the athlete has reached an automation of performance in terms of relying on imagery direction of the right hemisphere. Training procedures most efficient in attaining automation of performance is of primary concern to the coach. This amount of time actually available for athletic practice may be the single most limiting factor regarding peak achievement. If the coach has access to the athlete for practice over prolonged periods (six to eight hours daily), then I agree with Dr. Hall that a 50% split in mental and physical training may be appropriate. However most athletes today do not have personal schedules that will permit such training time.

It is my belief that the physiological condition is the all-important prerequisite for peak competitive performance. The true athlete must spend time in strenuous physical training to attain levels of muscular strength and cardiovascular endurance specific to the demands of a given sport. If my field hockey players are unable to run up and down the field for a full 70 minutes, they could mentally practice shooting, tackling, and passing images all week for naught.

The very feel of peak performance is, in itself, reinforcing. Therefore, the athlete should be taught to magnify the peak movement. This may be done by attention focus and directed concentration of the mind. Following a completely correct execution of a skill, the athlete should internally recognize the feel of that success. In keeping with Dr. Hall's model, the right hemisphere has directed the action. The left hemisphere identifies success following execution. Here it

may be appropriate to recreate the physical performance in the right hemisphere imagery mode several times to intensify awareness of what the feel is actually like. This immediate focus of concentration, theoretically, should reinforce the correct physical performance when reinforcement is most potent, that is, immediately following the event. The combination of mental and physical practice coupled with hemispheric integration of left side internal dialogue and right imagery focus may be practical.

A carefully prescribed program that teaches mental discipline must be created. Effective shared direction of physical performance by the left and right brain hemispheres can be learned by the performer. Such hemispheric integration should be taught in the same logically ordered, progressive manner as was the physical skill.

FOOTNOTE

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10

Competitive Stress Management Techniques in Perspective

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This chapter presents a review and a synthesis of all the previous papers and coach reactions published in this book. In addition, it will analyze the wide variety of competitive stress management techniques from a researcher/clinician standpoint while still maintaining the "frontline" perspective from the author's memories as a player and a coach in previous years.

It is important to focus upon the *management* of competitive stress, not *elimination* of it. Experience dictates that the majority of all superior performances occur under peak competitive pressures. Some athletes seem to thrive on the high pressure environment while others tend to fall apart under these conditions. The athlete who chokes under pressure is often a better practice or scrimmage competitor than the athlete who rises to the occasion under stress. As such, we must recognize the individual needs of each competitor and prescribe the appropriate management technique from a broad selection of choices.

Another very important variable to consider in developing optimal competitive stress management is the differences among coaches or clinicians. Even the most universally effective stress management technique will not be appropriate for all coaches or clinicians. The belief factor is a powerful element in success or failure and the athlete will quickly pick up nonverbal cues (from the disbelieving coach) that influence his or her motivation and cooperation. Beyond simple belief in a technique, there are some procedures which selected coaches/clinicians cannot effectively convey to an athlete. It is not likely that Woody Hayes would have had much success with the quiescence of progressive relaxation, visual imagery, or biofeedback.

In the formula for successful competitive stress management, another element to consider is the nature of the sport or the event itself. Among the widely varying sports (swimming, diving, baseball, archery, gymnastics, football, tennis, golf, basketball, volleyball, soccer, wrestling, boxing, hockey, figure skating, weight-lifting, etc.) there are several inherent cognitive-behavioral characteristics. Some of the dimensions include: team *vs* individual; power *vs* finesse; speed *vs* endurance. Requirements vary greatly for precision, foresight, coordination, balance, and aesthetic beauty. Each type of sport places a unique demand on the athlete so the stress management technique must be chosen accordingly.

With these three elements to consider (the individual athlete, the individual coach or clinician, and the nature of the sport), the formula for success might be best achieved by selecting the appropriate technique according to the model presented in Diagram 1.

Unfortunately, we do not yet have sufficient information to be able to compute a factor for each of these criteria to predict which technique will be most effective. However this

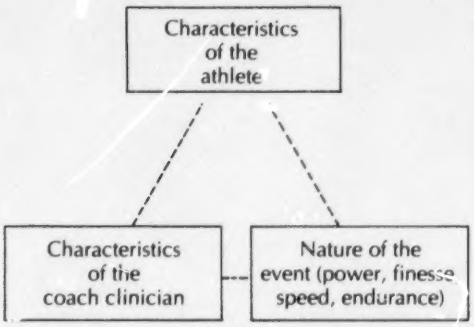
Characteristics of the athlete
Characteristics of the coach clinician
Nature of the event (power, finesse speed, endurance)

Diagram 1. Selection of the most effective competitive stress management technique for each individual athlete.

model represents an intriguing approach to decision-making in this field. In the absence of precise, data-based criteria, I predict that the most effective coach and clinicians will find their success through empirically derived considerations of these elements. With this rough perspective in place, I can now approach the analysis and synthesis of the techniques presented by the authors in this book.

Psychophysiological Analysis of Competitive Stress

Psychophysiological response to stress of any nature or source can be objectively measured. The parameters of interest for competitive sport include heart rate, blood pressure, muscle tension, skin temperature, and palmar sweat. There are clearly defined procedures for administering a standardized emotional stress test which parallel the techniques used in exercise tolerance testing.[1] Briefly, the general guidelines specify presentation of a challenging circumstance with progressively increasing gradations of speed, complexity, and/or frustrating distractions. These are, of course, common elements in many competitive sport circumstances, as well. For most accurate analysis of individual responsiveness to stress, it is necessary to use sophisticated monitoring devices in a carefully controlled laboratory environment. Fortunately, however, the physiological parameters of interest in sport are also generally observable, though with less absolute accuracy.

Cold, clammy, and perspiring hands are easily recognized by the alert coach who is usually in close proximity to the athlete during precompetition. High levels of muscle tension are nearly always present when the athlete appears fidgity and trembling, at one extreme, or braced in a frozen position at the other extreme. Heart rate and blood pressure are less easily observed, but they are probably not as detrimental to performance as the aforementioned parameters.

In addition to the observable signs of stress response there are many stress-related symptoms which the athlete might experience. Sometimes a coach will hear about or see the athlete so aroused that he/she vomits, but it is equally as important to query the athlete regarding less dramatic symptoms. Kroll has cited a list of somatic complaints including upset stomach, nervousness, urge to urinate, ringing in the ears, and sore muscles. In some cases, the athlete may not realize that a specific symptom is linked with the precompetitive environment. It may be overlooked as a slight case of the flu.

Another common element in the competitive stress environment is aggression. The coach or clinician should be alert for signs or reactive aggression which Kroll[2] notes are different from instrumental aggression. The former emotion exhibits anger and hostility which are totally different from the goal-oriented instrumental aggression characteristics. One should note the underlying causes for verbal abuse, fights, and brawls on the playing field. In many cases the athlete experiences guilt or self-deprecating feelings (associated with performance) that are transferred into reactive aggression. These are truly stress-related symptoms and should be recognized very early and averted.

Cognitive (Mental) and Somatic (Body) Methods of Coping

If fear of failure is a common source of anxiety in competition, then one must acknowledge the role of cognitions in producing the stress-laden circumstance. In contrast, the somatic aspect of stress is usually a response, not a cause. However, the somatic compo-

nents of a stress response often exacerbate the cognitive element and tend to perpetuate the experience. Stress response can be described as a vicious circle as shown in Diagram 2.

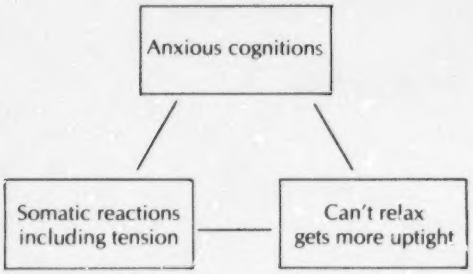

Diagram 2. Stress response.

In presenting this model it is important to note the positive, as well as negative, potential therein. Gauron has recognized the unused potential that athletes need to unleash.[3] Sometimes trying too hard confounds success. The vicious circle shown in Diagram 2 can work both ways, that is, facilitating or debilitating one's performance. Gauron documented remarkable achievement in swimmers at the University of Iowa pursuant to initiation of mental training with the athletes. One hopes that it is more than coincidence that the Iowa swim team moved progressively upward in national ranking (NCAA champions in 1981) within two years after this psychologist began consulting with the team. He admits that better athletes were recruited during those years, but recruiting has improved also because candidates knew the coach incorporated mental training. Gauron deserves credit for including psychological assessment of pre- and post-training. He may be on the brink of establishing one element of the formula presented in the introduction (see Diagram 1), that is, he has begun to assess individual characteristics (concentration, psych-up, visual, kinesthetic, olfactory sensations, and self-talk) which might, in the future, be predictive of which stress management procedure would be most successfully prescribed for selected athletes.

Olcott's reaction to Gauron is very appropriate and supportive. She quotes a poem that ends with the phrase " . . . the man who wins is the one who thinks he can."[4]

Another approach to the cognitive element in sport was presented by Ravizza and Rotella.[5] They took a humanistic, phenomenological orientation in working with competitive gymnastics. I was very impressed with their empirical approach to the problem. In actuality, it's not a problem, but rather a unique experience. They strongly recommend an in-depth interview with each athlete to determine whether there might be some unique, objective, cognitive factors present on those rare occasions when "I could do no wrong." Many athletes have had these occasional perfect experiences where "they just couldn't miss." To begin to identify the antecedent causes or to realize that one's inner self might be so terribly influential upon performance is a startling and useful concept.

Ravizza and Rotella also cited other valuable strategies. They recommend helping the athlete to assess his/her optimal anxiety level. This can be measured with the Sport Competition Anxiety Test or Nideffer Attentional Test. By getting the athlete to personally recognize their own physiological responses (tension, shallow breathing, sweaty palms, etc.) they are moving toward an objective formula for success. Awareness is the first step toward change and it also enhances successful prescription of a stress management technique.

The most innovative approach Ravizza and Rotella used was the I-Thou philosophy. That is, they ask the gymnast to develop a "oneness" relationship with the apparatus. Anyone who has ever tried to maneuver on a pommel horse or parallel bars will quickly recognize the importance of flowing with the apparatus. When a gymnast begins to fight the natural flow of movement, the performance quickly deteriorates. This may appear to be soft science, but it is very real to the gymnast.

Another effective approach in gymnastics has been described by Frederick.[6] He noted that errors on the gymnastic floor are usually coincident with "dysponetic" bracing efforts. Efficiency is greatly impaired when the athlete has insufficient tension control. Accurate as-

sessment and recruitment of muscle fibers for a given performance task is dependent upon the psychophysical principle of "signal detection theory."[7] In the same manner that some individuals have very accurate perception of pitch for piano tuning, so also some athletes have very accurate perception of muscle activity for movement performance. As such tension control, as projected by Edmund Jacobson in progressive relaxation and differential relaxation, is extremely crucial for athletes at minimal as well as maximal levels of contraction.[8]

In order to enhance tension perception skills, Frederick suggests that both coaches and athletes learn relaxation skills in a supine lying position. Transfer to the functional setting can be developed later.

I strongly agree that coaches need to understand these skills in order to be good observers of their athletes. They need to recognize disruptive behaviors in eye movement, respiratory pattern, and jaw clenching. Early detection and acknowledgement can be useful to avert tension-riddled performance decrement in the face of heated competition. My own experience with Jim Hartung, NCAA All-Around Champion in Gymnastics for Nebraska is quite notable. Interview data from Hartung shows that he has an unusual ability to focus his attention on his own performance. He uses mental rehearsal with small physical cues to avoid distraction from the crowd or other performers. Even in practice, he tries to simulate competition conditions by asking a critical observer, such as a coach to observe, and finishing every routine regardless of errors. This characteristic is very common among successful international competitors.

Biofeedback, Hypnosis, Mental Rehearsal, and Restructuring

Biofeedback as a means of coping with competitive stress is only a very recent conceptual trial. The logistics of using sophisticated monitoring devices on athletes who are involved in extremely dynamic irregular movement patterns is extremely difficult. Just the cost of equipment and the time involved is beyond the scope of most coaching and sport administration circumstances. Yet the principle involved (feedback of performance outcome to the conscious or subconscious awareness of the athlete) is as basic as learning itself. Learning in any environment must include feedback, whether it comes from a knowledgable observer or from simple outcome success, i.e., visual documentation that the basketball either goes through the hoop or it doesn't. Empirically we know that some athletes are better than others incorporating knowledge of success/failure into their neuro-muscular pathways during the trial and error process

The natural learning ability based upon wise use of feedback seems to be a phenomena that functions at the subconscious level. In other words, the "natural" athlete we observe seems to have an inherent ability which he/she does *not* have to try hard to achieve. In fact trying hard seems to confound the learning process. All of this discussion about the learning process in athletes coincides very well with the concepts used in behavioral medicine where biofeedback facilitates reversal of adverse physiological functioning that had previously resulted in organic dysfunction, e.g., tension headache, hypertension, etc. The important point is that patients who try hard to reduce muscle tension for relief of headache will invariably fail. Success is most often achieved in a mental state characterized by a free-floating, "let-it-happen" attitude. Now we can clearly see the parallel between successful athletes and patients who succeed in eliminating a physiological disorder.

In light of the discussion above, perhaps it is possible to use biofeedback to enlighten the athlete's subconscious (in a quiescent, inactive state) and to make the transfer to the competitive scene with mental suggestions of perfect performance. In many cases this may take the form of a minor reduction of muscle tension in a crucial antagonist muscle group. The resultant outcome is a loose, fluid, unimpeded movement which appears graceful as well as correct or successful. As such, we often note that the natural athlete makes it look so easy. Perhaps the performance is actually "easy" because the athlete is not

struggling with the interference of unneeded muscle groups that might have been recruited in the ill-fated "trying too hard" behavior.

Zaichkowsky has summarized the literature to compare athletics with stress-related disorders.[9] The common element is that elusive and poorly defined concept "stress." He has cited "choking" phenomena which exemplifies all that has been discussed above. He also contributed a very comprehensive set of guidelines for the use of biofeedback in the sport setting.

We may never see athletes practicing routines with a web of wires and transmitters attached to every functional muscle group. It is more likely that biofeedback will be utilized to facilitate quicker success through other cognitive and somatic strategies such as mental rehearsal, stress inoculation, progressive relaxation, autogenic training, hypnosis, etc. The true value therein is equally as great as anything perceived in the eyes of any engineering genius pursuing the "wired" route. Zaichkowsky is a clinically experienced biofeedback consultant who states emphatically that "biofeedback is merely a tool to enhance self-regulation." It is apparent that optimal self-regulation is the key to successful athletic performance in the face of heated competition.

Hypnosis is as very powerful cognitive tool which, like biofeedback, has been successfully used in the clinical health field. Its application in the sports arena is a function of the suggestibility as discussed by Eskeridge.[10] Athletes will benefit from its use only insofar as they are able to submit to its influence at the subconscious level. Athletes vary in their ability to establish this communication between the conscious and the subconscious. Many professionals currently downplay the conceptual and functional difference between hypnosis and other cognitive strategies. Surely relaxation and imagery are essential elements in hypnosis and the trance-like state may be present in a variety of relaxation-like circumstances. Thus perhaps it is better to downplay the semantic caricature of hypnosis since the word itself is so poorly accepted in the athletic environment. For those who wish to pursue it subtly, the outcome and the methodology in athletics are clearly documented by European practitioners.[11]

Objective experimental evidence in the neophyte field of competitive stress management is relatively rare. The primary obstacles are the confounding problems of doing field studies, the difficulty obtaining bona fide competitors who are willing to be arbitrarily assigned to treatment or no treatment groups, and difficulty in masking a control group to yield apparent treatment status for expectancy effect. Thus most researchers shy away from these studies. Ziegler took this challenge and found interesting results in basketball and in track.[12] She observed that subjects randomly assigned to the combined imagery and physical practice group were significantly more successful in shooting free throws than subjects assigned to imagery alone, guided imagery, physical practice, or control.

Ziegler also conducted an experimental study on track athletes utilizing two different techniques, Meichenbaum's Stress Inoculation and Smith's Stress Management, in comparison with a control group. Heart rate and oxygen consumption values were significantly lower for both treatment groups than for the control group after training. These results are supported by previous research with similar experimental design using biofeedback of heart rate.[13] These effects, which notably decreased physiological function during exercise under cognitive influence, are truly remarkable. However, the real test of performance will lie in competitive success and that has not yet been adequately tested.

All of the strategies described above purport to provide the athlete with a means of controlling competitive arousal by cognitive means. Underlying each procedure is the inherent fact that athletes who fail to control arousal, have done so by allowing themselves to become upset. The success of some athletes under the worst environmental conditions attests to the fact that cognition, not external stimuli, causes the upset. As such, we need to emphasize to the athlete the Ellis concept that "I upset myself."[14] As such the athlete has the internal ability by volition to avoid that upset cognitively.

If cognition is important at the practical

level, then hemispheric dominance may serve to account for the remarkable differences in athletes. Recent research has clearly shown the hemispheric difference in cognitive functioning. The left hemisphere controls verbal, analytical, and rational behavior while the right hemisphere controls imagery, intuition, and creativity. Hall has extrapolated the results of neural research to its relevance in sport.[15] The general hypothesis is that highly creative, fluid, relaxed successful athletic performance is likely to be concurrent with right brain activity. But since the right brain is overshadowed by the left brain during high-stress, aroused conditions it is not surprising to observe performance decrement. The impact of competitive stress management is likely effected through facilitation of right brain activity in the midst of an arousal reduction. Right brain activity might also account for the peak performance phenomena described by Ravizza and Rotella.[16] It is logical to assume that right brain activity is the neurological mechanism which accounts for performance success or failure in competitive stress under the influence of a variety of cognitive control strategies. The future for development in this area appears to be very bright.

Conclusions

In summary, it is apparent that competitive stress management is an essential aspect of sport psychology training and of athletic training in general. The professional development in this field is at the neophyte stage, but it is rapidly burgeoning. Ultimately the prescription of a stress management strategy for a specific athlete will be determined by the careful observation of the nature of the competitive event; the characteristics of the coach/clinician; the characteristics of the athlete.

The burden of responsibility lies with the coach/clinician to utilize objective psychophysiological techniques and empirical observation to assess the athlete's need. If the coach/clinician does not recognize that anxious cognitions elicit disruptive muscle tension reactions which preclude relaxed behavior, he/she will never be able to prescribe appropriate competitive stress management strategies necessary to facilitate superior performances. It is obvious that "peak performances" occur only when the athlete has achieved maximal cognitive and somatic control. The principle of efficiency, which comes about with perfect perception of effort, is the hallmark of success in sport competition, as it is in almost every performance circumstance. The minimum basic element seems to be getting the athlete to ignore competition distractions and focus attention upon the details of the performance. As such, the athlete never achieves great success by "trying harder," rather the performance must come about with a free-floating, "let-it-happen" attitude. Thus the development of cognitive, right-brain dominance is crucial to sport-related achievement.

In the past few decades, great advances in sport performance have occurred largely because of sophisticated physical training techniques. Now as performances seem to be reaching an asymptote, the great opportunities appear to lie in sport psychology and competitive stress management where refinement and creativity are the key words.

FOOTNOTES

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Dr. Len Zaichkowsky is an Associate Professor at Boston University's School of Education. He is an instructor of Psychology of Motor Behavior, Motor Development, Biofeedback, and Research Methods. He is licensed as a psychologist in the State of Massachusetts, is a member of the Biofeedback Society of America, and is presently the President of the Biofeedback Society of Massachusetts. Dr. Zaichkowsky is one of the first researchers to write on the topic of biofeedback and its application to motor behavior and sports. Since 1975 he has delivered numerous papers and published 7 research articles specifically concerned with biofeedback and human performance, including a review article in a recent book edited by Yuri Hanin-Institute of Physical Culture, Leningrad, U.S.S.R. In 1979 Oregon State University awarded him a "Distinguished Educational Research Award" for his work in applying biofeedback to education.

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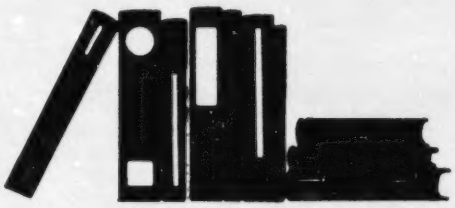

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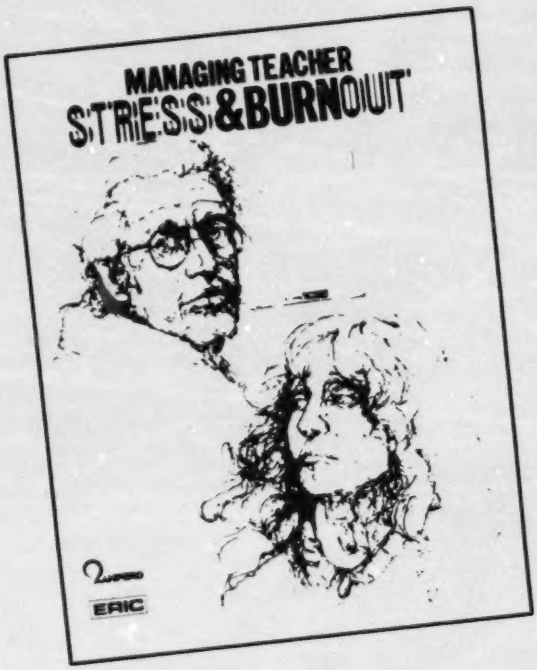

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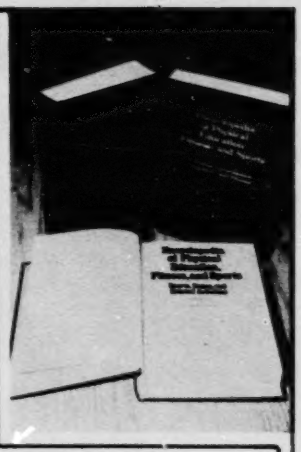

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